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AUGUST 1948

BUSINESS · ENGINEERING · INDUSTRY

What Does European Recovery Plan Mean to Your Business?

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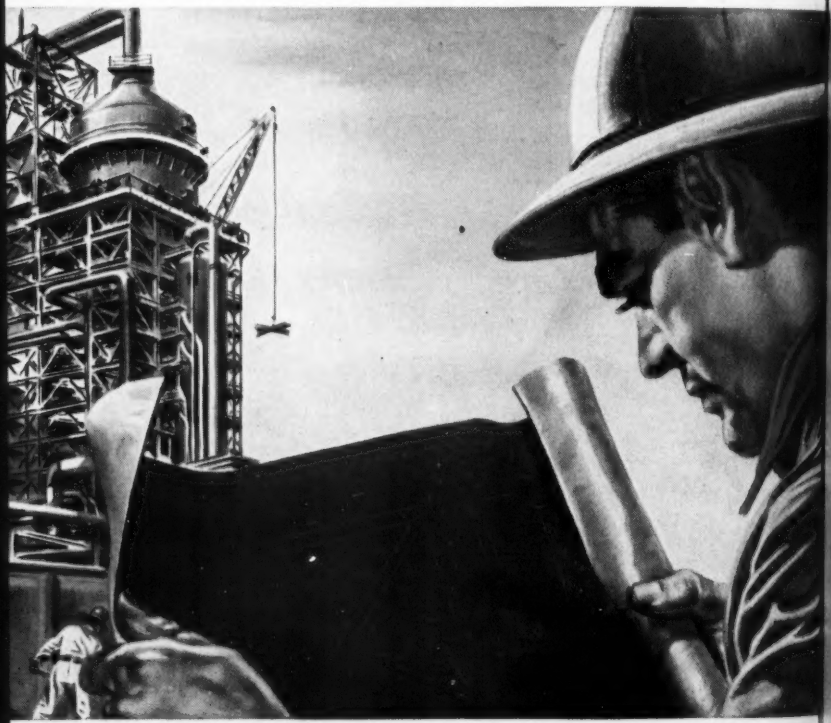

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HEAT ENDURANCE	EXCELLENT	VERY GOOD	EXCELLENT	VERY GOOD	EXCELLENT
RESISTANCE TO ACIDS	GOOD	EXCELLENT	GOOD	EXCELLENT	EXCELLENT
RESISTANCE TO ALKALI	FAIR	EXCELLENT	FAIR	GOOD	EXCELLENT
RESISTANCE TO OIL	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT	EXCELLENT
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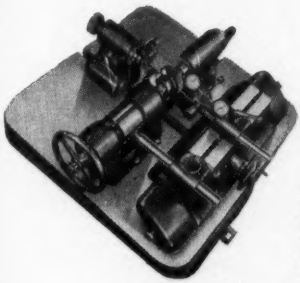

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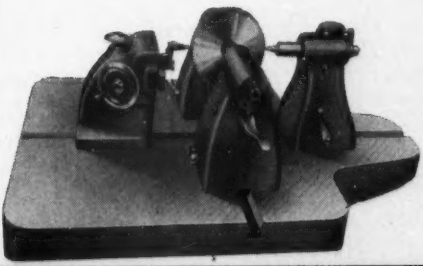

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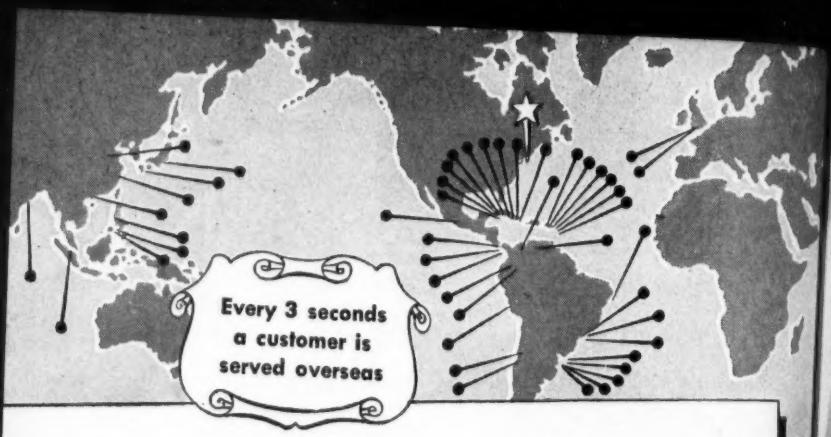

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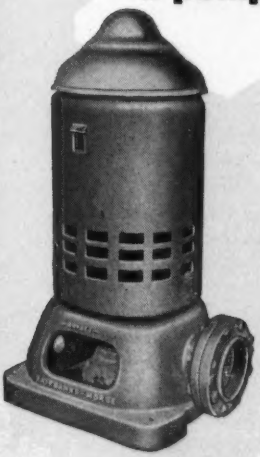

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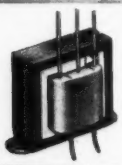

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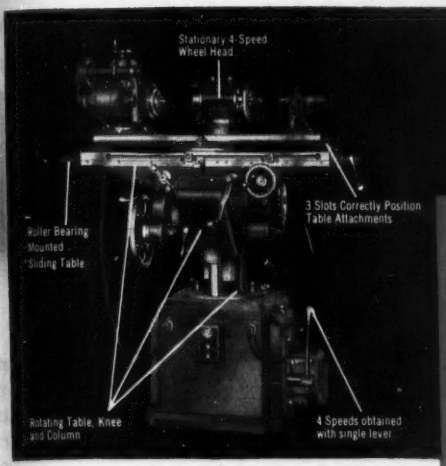
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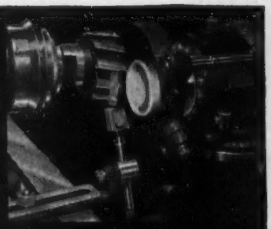

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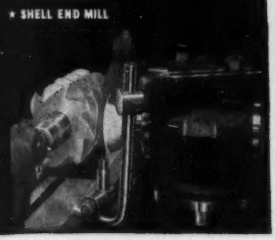

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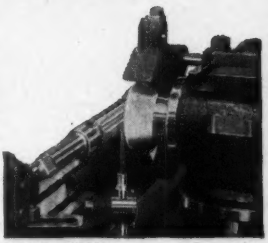

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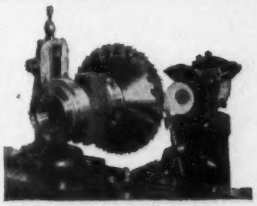

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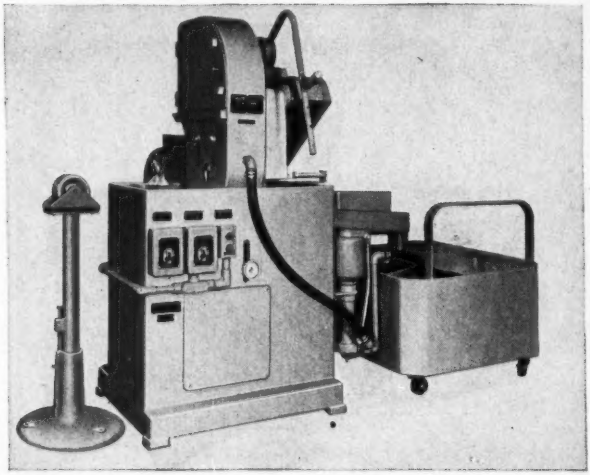

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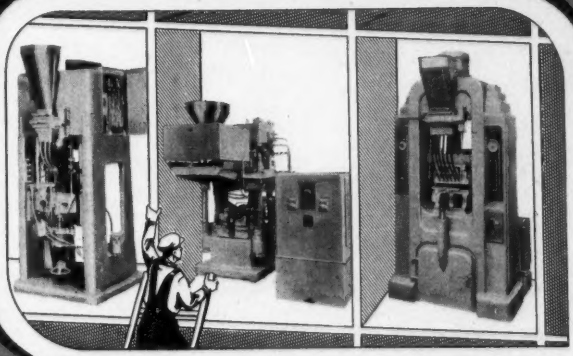

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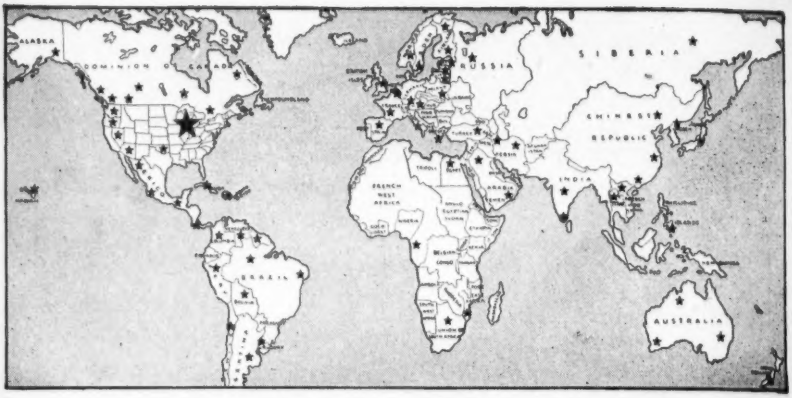

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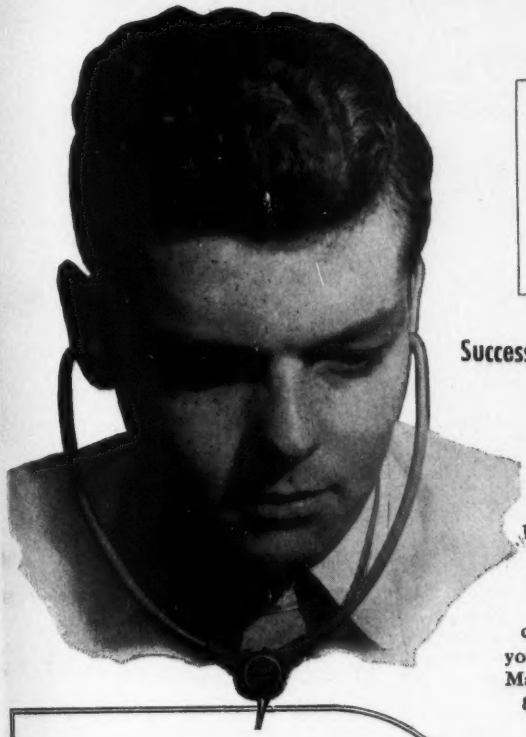

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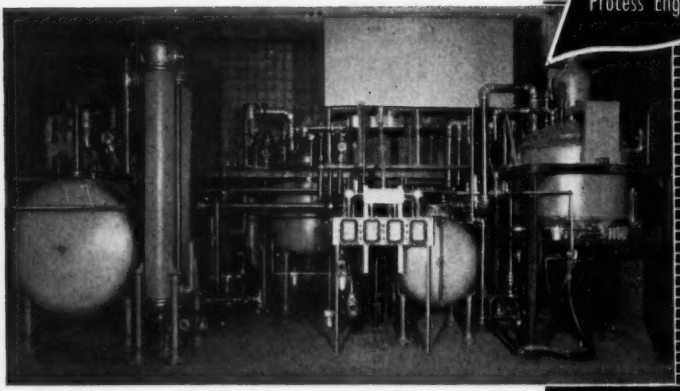

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BUSINESS TRENDS

U. S. industrial production is booming, moving up to new highs. Doubts following the farm commodity price break in February are gone. Consumer demand is higher than ever (page 19). Money is plentiful. Price trends are mixed, but on the high side.

All this adds up to higher prices—importantly pushed by third-round wage increases. General Motors' wage advance, based on a vicious cycle of higher living costs, higher wages and no encouragement to increase worker productivity, has destroyed efforts by other companies to stabilize wages and prices, and will lead to higher prices in a number of lines.

Chrysler, Studebaker, Nash-Kelvinator, General Electric, Westinghouse, Firestone Tire & Rubber, Goodyear Tire & Rubber, and many others have fallen into line. Truck and tractor prices are higher, machinery prices are moving up, and coal will join the parade. Petroleum and steel look like the next in line.

But farm commodity prices look more promising. Good crops in Europe, favorable weather in the Balkans, and the prospect of the second largest U. S. wheat crop in history are affecting prices in futures markets. At the moment, prices on a few consumer goods too, such as refrigerators, are trending downward, but these may be reversed with added material and labor costs. Supply and consumer price resistance may determine the direction in which individual prices may move.

For an over-all view of the situation, **expect a higher general price level for U. S. goods.** Certain U. S. government sources, probably overly-pessimistic, predict a commodity price rise of about 10%. Worker productivity, now increasing and above prewar levels, is expected to help level off effects from higher wages, ERP shipments, and the token rearmament program.

The Economic Cooperation Administration (ECA) is beginning to act vigorously to revive intra-European trade. In the first two weeks of June, Administrator Hoffman authorized "offshore purchases" in Europe totaling almost $7-million —and more are being pushed through (for what to expect in the future, see page 57 for "What Does European Recovery Plan Mean To Your Business?").

The biggest single purchase—for western Germany—was $3-million for Italian fruits and vegetables. Austria gets $1.2-million for Norwegian whale oil, Greece $1.2-million for German coal. For Austria also—$720,000 for German or Polish potash, $320,000 for basic slag, $314,000 for superphosphate.

Buying in **Latin America** has started: $5-million of Venezuelan oil for Italy, $2.9-million of petroleum products from Western Hemisphere and also Persian Gulf for Greece, $116,000 of Mexican canned beef for Trieste. Offshore buying will be stepped up rapidly as the program gets rolling.

ECA is also looking critically at exorbitant prices holding up trade between European countries of scarce goods. A few facts emphasize this condition. (1) A million tons of European coal is available to buyers who can pay dollars; (2) Belgium has extra steel, but the price in Athens is about double the figure in Brussels. There is talk of direct U. S. pressure to break the jam.

The biggest barrier to European trade is the breakdown in the payment system. The U. S. will help Western Europe straighten out its internal exchange problem.

Two plans are being considered. One plan provides for establishing a separate monetary fund. The other, already in effect on a limited scale, will use ECA dollars to balance intra-European trade accounts. Look for this scheme to expand and be applied to difficult cases, such as French-Belgian trade.

Also watch for U. S. to **help ease Britain's commitments** to the sterling area. Reliable sources indicate that a decision has been made on this policy. Basic problem is sterling-area demand on Britain for dollars—about $300-million annually.

Chief assistance will come from U. S. Export-Import Bank, with additional help from World Bank dollar loans to sterling-area countries. Export-Import Bank will make dollar loans for purchase of U. S. commodities. But do not expect ERP dollars to be spent for raw materials from the sterling area. No such program is planned, despite talk of offshore purchases of this type to relieve Britain's position.

U. S. investment possibilities in Europe look brighter. ECA has the authority to encourage direct investments by guaranteeing up to $300-million for currency conversion. Oil companies are taking the lead in requesting coverage under the exchange guarantee. Others include rubber, food processing, container manufacturing—a total of 50 firms to date. But most U. S. businesses are going slow on new investments in Europe—waiting to see how the ECA program works out.

Trade between U. S. and Russia is expected to increase materially during the third quarter of this year. The reason: a more liberal application of U. S. controls set on March 1. U. S. shipments of machinery to Finland signalled easing of the embargo on exports to Russia and Russian-controlled countries.

The policy on trade to Russia and eastern Europe is to:

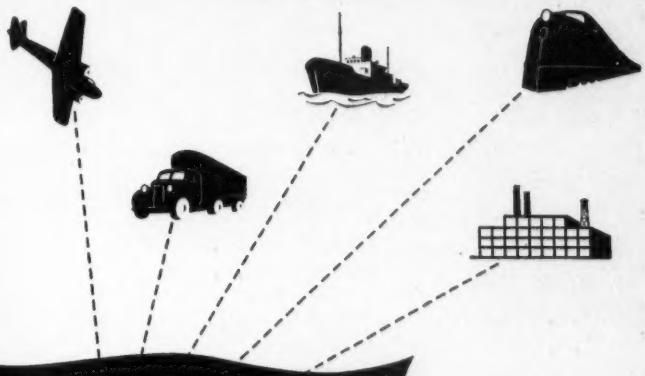
(1) Allow exports of "safe" goods—tobacco, kitchenware, hand tools, movie films, vitamins.

(2) Prohibit shipment of war goods—explosives, airplane engines.

(3) Treat everything else as separate cases—machinery, transportation equipment.

The last rule is the important one in Russian trade. Russia wants machinery, U. S. has it. During first quarter of this year, over 90% of U. S. exports to Russia was industrial goods.

Items on these pages come from McGraw-Hill magazines and news services.



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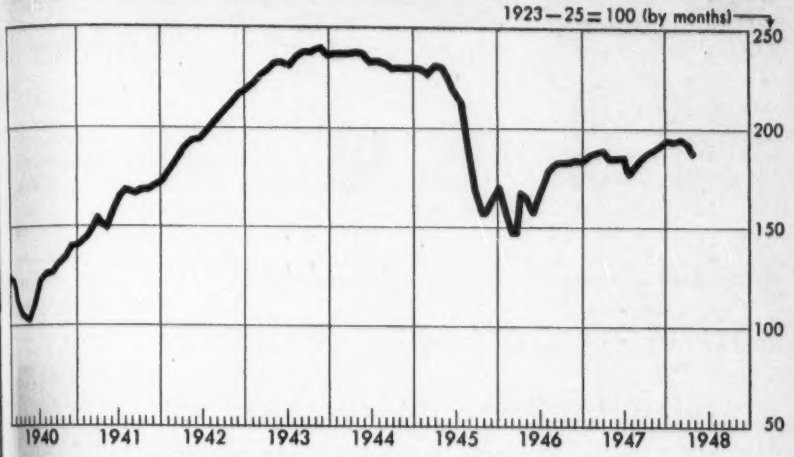


BUSINESS ACTIVITY has climbed steadily since the war. Now . . .

Production Booms; Demand Stays

Greatly increased consumer demand for durable goods offsets the increase in production by U. S. industry. Most plants running at or near capacity

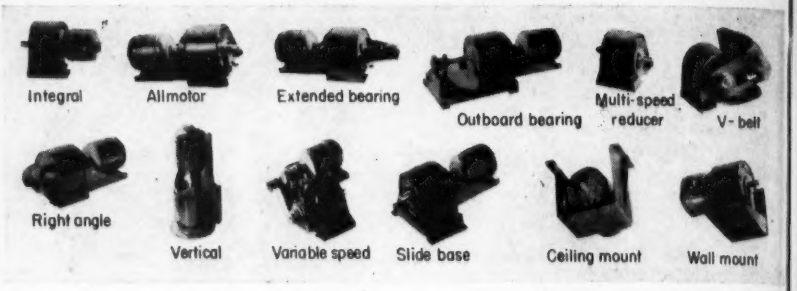
U. S. PRODUCTION has survived the commodity price break of last February and output is on the increase. But added productivity has not decreased backlogs on manufacturers' books. The added production will not go far in meeting demands for hard goods from across the water. Domestic demand during 1948 for durable goods will set a new high. Business activity in this country is edging back to the peacetime level it set early in 1948.

Plants, with only a few exceptions, are running almost at capacity. Shortages in basic materials, especially steel, restrict output in a few plants. Some plant managers say that if more raw materials were available plant capacities could not process them.

Textile men, though, are worried. Orders for the last half of 1948 are [illegible]. Buyers are hesitant to place orders—waiting for a price pattern to be established. Worsted manufacturers still have backlogs of orders, but have been forced to raise prices to meet new price increases in raw wool. Four woolen mills in New England have closed; eight more may follow.

Raw material prices and consumer resistance are hurting the shoe industry. Machine-tool manufacturers are hoping for a business up-turn by late summer.

Consumer demand for durable goods is at a new high. Between $5.8- and 8.4-billion will be spent in 1948 for automobiles if the manufacturers can supply the pent-up demand. Third-round wage raises had boosted car prices by mid-1948. For housing, $12.6- to 19.3-billion will be spent. Furniture, radios, refrigerators, washing machines, and other durables will run $3.1- to 4.0-billion.—Business Wk. Jn 5 19



SCALE MODELS, showing some of the shaft arrangements and mountings possible without modifying the basic unit, helped the designer to limit special units

Unit-Design Gear Motors

Concentric and right-angle shaft arrangements, for both vertical and horizontal driving, are provided by designing around a basic unit

FALK CORP. has standardized its design of gear motors around a basic unit. The result has been a drastic reduction in number of different parts, accompanied by lower production costs, improved deliveries, and other benefits.

The first step was development of a radically new type of welded steel housing. It consists of an arched cover portion extending over two heavy end plates having sloping sides, a bottom plate with pads—all machine-welded together to form a strong, rigid structure. This unit can be manufactured with little scrap and salvage.

The next step was design of the basic unit, comprising the main cost elements of the transmission and permitting mounting of various attachments. Combinations thus available include all-motor and integral types of Motoreducers in concentric and right-angle shaft arrangements, and for vertical and horizontal driving or mountings.

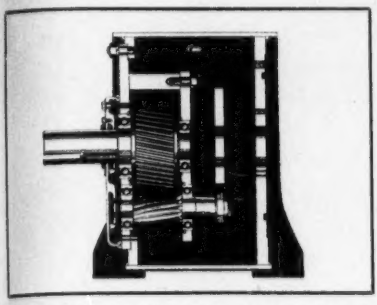
All these variations are possible without modification of the stock basic unit. Vertical units require only the application of a circular mounting ring and mercury oil seal to the standard horizontal unit. Right-angle units are obtained by adding a bevel-gear head to the standard reducer.

The basic-unit standardization reduced Motoreducer housings from seven to one. Gears formerly stocked dropped from 164 to 22, while present ratios are five times those in the old line.

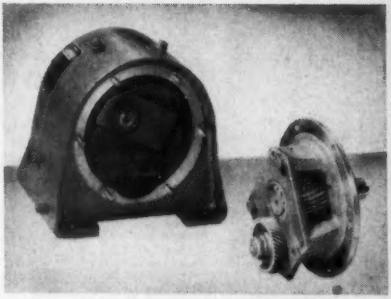
Brackets also were reduced in number and standardized to National Electrical Manufacturers Association (NEMA) dimensions so all can be jig-drilled. A bracket now is provided for each motor frame regardless of the size of unit on which it is used.

During design of the entire line, constant attention was concentrated on ease and economy in manufacture of redesigned parts. Each new design was analyzed as to its machinability both for ease and economy.

The re-engineered steel-head and bearing-plate assembly, for instance, can be turned, faced, and bored in a turret lathe to high accuracy. The housing itself, except for drilling and pre-milling, can be finished at one setting on one machine and in only two-thirds the time required for the previous design.



ALL-STEEL housing receives gear elements bench-assembled in supporting structure



BASIC UNIT, consisting of housing and gears, can receive variety of attachments

An additional advantage when fewer machines need be used is the savings in overhead. Trucking, handling, job-card writing, routine, setup, supervision and inspection costs are materially reduced. Moreover, production can be better paced to demand, allowing sharp reduction in inventories without affecting delivery schedules.

Minor details too were considered, with resulting savings. Blind tapped holes were changed to through-drilled tapped holes by use of self-sealing studs. Modern deburring tools eliminated hand deburring in assembly. Plastic coating on gears prevented damage in transit and shop storage.

Redesign also took into account consumer acceptance and requirements, important of which are strength and accuracy. Strength, for instance, should be balanced to obtain nearly equal ratings in various component parts. So shafts and gears were designed to withstand severe jams or any accidental overloads that might be applied.

Ordinarily, overhung loads are checked against listed allowables. In redesign of the Motoreducers, shaft sizes were increased, which together with the large bearings made it possible to apply sprockets having diameters only 2½ times that of the shaft. This obviates need for computing the load, and the added strength minimizes breakdowns caused by misapplication.

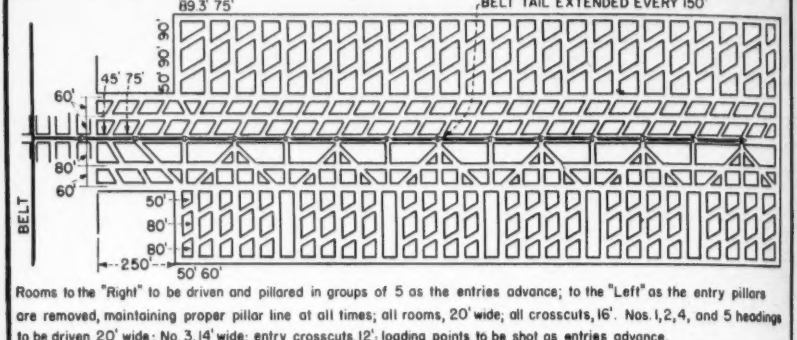
As gearing is the heart of a speed reducer, special attention was paid to all gear elements. Their strength and durability depend on their hardness. While an untreated gear has low allowable loading, a gear fully hardened after cutting is subject to distortion even though its allowable loading is satisfactory.

Falk therefore compromised on heat-treating chromium-manganese-molybdenum steel to 285 Brinell hardness for gears and 335 Brinell for pinions, and machining after hardening. Excellent ductility and shock resistance are obtained in this hardness range with the alloy steel.

Furthermore, the material retains enough plasticity for corrective adjustment of tooth contacts in case of malalignment of gear elements. These advantages offset any slight advantage that might be obtained in lower machining costs for gears hardened after cutting.—Prod Eng, Jn, 153

ERP and Your Business

As the European Recovery Plan will have a decided impact on world business and commerce, we have brought you in this issue, page 59, a 7-page chart report for your guidance on the over-all program.—*The Editors*



Rooms to the "Right" to be driven and pillared in groups of 5 as the entries advance; to the "Left" as the entry pillars are removed, maintaining proper pillar line at all times; all rooms, 20' wide; all crosscuts, 16'. Nos. 1, 2, 4, and 5 headings to be driven 20' wide; No. 3, 14' wide; entry crosscuts, 12'; loading points to be shot as entries advance.

HALF ADVANCE and half retreat in room panel, shuttle-car and belt service to loaders. Diagonally driven room crosscuts cut shuttle-car tunnel.

U. S. Coal Mines of Tomorrow

Need for increased production forces U. S. operators to improve extraction methods and equipment. Output to rise 12½% by 1950

INCREASED DEMAND for coal in the future has placed increased pressure on U. S. operators. To meet this growing demand, operators are adopting improved methods of extraction and preparation and are planning to install much new equipment. To determine what the "mine of tomorrow" would be, *Coal Age* magazine surveyed 234 bituminous operators, producing 172,677,000 tons of coal, or 28% of the total U. S. output.

They report daily output will be increased 12½% by 1950. Much of the increase will be from new operations—deep, drift, and strip. Deep mining in the future will become more and more a drift operation in coal 4–4½ ft. thick. Capacities of new mines will range up to 20,000 tons per day or more; life expectancy of the mines will be 20 to 30 years, with a few over the 30 yr. mark.

An increasing number of deep mines will fall into a new classification, called "contour mining," being operated from not one but several portals around the outcrop. In contour or "island" operations, each panel or working section has its own openings to the outside. Haulage road is in an open stripped cut. This will lessen the difference between deep and strip operations.

In deep mines, projected or only recently started, mechanization will be the keynote. Emphasis will be on self-loading conveyors and crawlers, track- and rubber-tired loaders. In thin seams, hand loading will be necessary. Mounted cutters and drills, timbering machines, power-operated man and supply carriers will be employed increasingly.

Belt slope will be used for deep coal. One mine plans to use a single-unit belt to a vertical depth of 700 ft. Where vertical shafts are used, trend is toward skips. Underground storage at skips will be used increasingly. At one mine a 7-ton skip works with 7-ton rotary-dump cars.

Hand loaded chain conveyors, feeding

a mother belt, are employed in island operations in seams averaging 54 in. deep. Five separate drifts are being operated, four mother belts discharging to the outside.

Number of headings in small operations will be increased to four, five, or more. This reflects increased use of loading machines and the need for getting more coal out in preliminary entry driving, necessary in retreat operations. Increased airways result, especially in thin-seam operations. One large operator started with a four-heading plan, then changed to six, and finally to eight.

Car-changing and car-loading stations are kept up as religiously in new mines as in room work, changing switches being employed at every crosscut in some operations. If shuttle cars are used, the trend is toward putting stations closer together to cut haulage distance.

Handloading will be used only where special reasons dictate—such as bad roof conditions. Using hand-loaded conveyors, one operation has averaged 7.3 tons per man in a 36-in. seam. Panels are mined half advance and half retreat, with 95% recovery of the pillars.

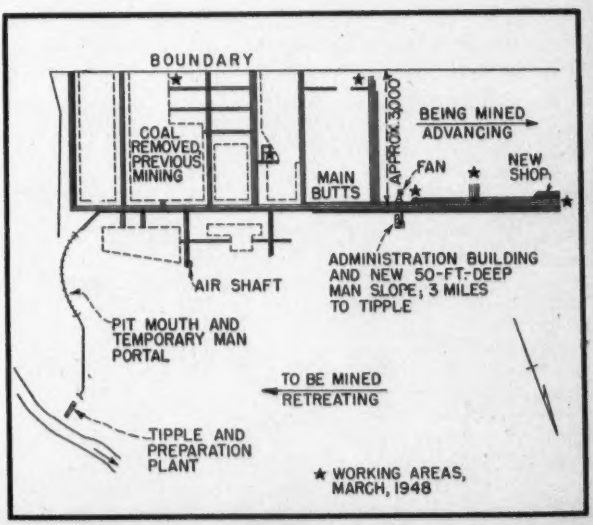
Track and crawler loaders are working seams as low as 48 in. Coal under 60 in. is handled in 3- or 4-ton cars; output per man varies from 6.2 to 12.3 tons. Coal over 60-in. thick is being carried in 8-ton cars, output per man averaging between 6.0 and 15.0 tons. Crew sizes in coal 60-in. thick or less run 10–15; in 60-in coal or deeper, crews run 11–19.

Shuttle cars are used at two thirds of the mines with seams between 36–60 in. Timbering machines are being used more.

Use of larger cutter bars and increased use of mounted machines will appear even in thin seams for face preparation. Hand-held drills are still the most widely used but use of mounted or special units is increasing.

One company had developed a 1-man drill, housed in an 18-lb. aluminum case and driven through power-takeoff from cutting machine for conveyor mining. Drive is rated at 5 hp. Drilling can be done while shortwall cutter is working across the face or while it is idling.

Underground, heavy rail, treated ties, block signals, and dispatcher control complement modern locomotives and cars where conveyors do not move coal from the face. Outside-haul mines still use standard-size cars but the trend is toward larger equipment. One operator



ADVANCE and retreat operation over a large mine, showing stages in making new openings

is adopting 18-ton bottom dump cars to run on 80-lb. rails. Larger cars are being matched with larger locomotives.

In deep mining, rail weight runs from 60 to 85 lb. Locomotive weight ranges from 10 tons single to 30 tons tandem, the latter rated 35–40 cars at 11 mph.

Fairly large cars are being used in fairly thin seams—one 43-in. seam operation using 8-ton, 8-wheel, solid-body cars pulled by a 20-ton locomotive. —Coal Age, Jn, 74

Plastic Plant Exhibits Unusual Process Features

Phenolic molding powders and liquid resins are now being made at Nobell Resins Co.'s Azuza, Calif., plant. Unusual features of phenol production are: (1) use of Schutte & Koerting eductors (jet-type pump) for intimate contacting under forced feed and (2) centrifugal separation of sulphonation products, extraction, and neutralization in multiple-compartment towers.

The molding-powder plant also is unusual in that it employs wet mixing of resins and fillers, which allows large single batches to be processed, reduces manpower needs, and lowers capital investment. The wet mix is dried by infrared, which allows continuous conveyor-belt operation and eliminates need for heated roller mills.—Chem Eng, Jn, PPI-49

Lights Conveyor Line

Lighting design for inspection of highly polished surfaces must counteract specular reflection, because the light-source image of a direct-lighting system would be reflected. Even with indirect lighting, too high an intensity is undesirable.

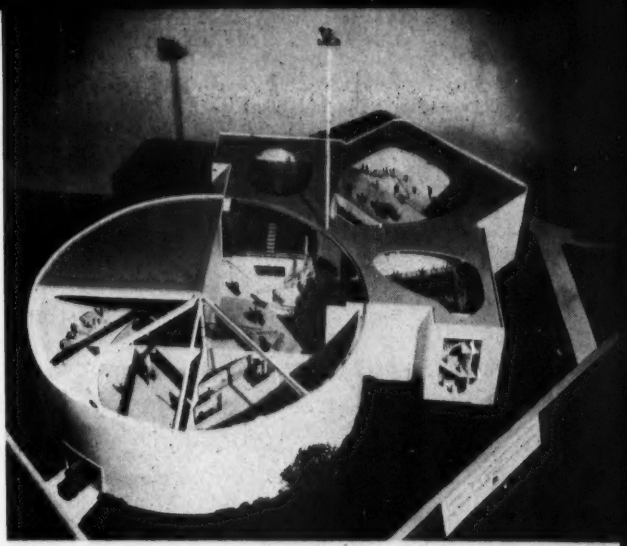
At the Cadillac Motor Car plant, a fluorescent-lighting hood has been designed to give proper illumination for inspecting chrome-plated parts. The hood, 6 ft. wide over a 4-ft. wide conveyor belt, is circular in shape, 21 in. deep, and made of 16-gage galvanized iron painted white.

Centered 35½ in. under the hood are inverted fluorescent fixtures, each containing three 40-w., 3500° white tubes. Brightness at conveyor level is 10–15 footcandles, sufficient to detect defects in the highly polished work surfaces, yet not bright enough so reflected glare causes employee eye fatigue.—Elec C&M, Jn, 128

CONTINUOUS metal hood with inverted fixtures gives wide-area, low-brightness illumination for inspection of grilles, hub caps, other chrome-plated items

CONTINUOUS TELECASTS

With a turntable stage and two seating areas, continuous television shows can be aired from this model television studio designed by Austin Co. As one program ends, the new production — controls, cameras, etc. — slides under the other set. Curtains part to permit the audience to see second show. — Business Wk, Jan 12, 26



Ford Redesigns 1949 Models; Coil Front Springs Adopted

Cylinder block, crankshaft, and wheelbase length were left unchanged in the 1949 Fords. The rest of the car has been completely redesigned. Coil front springs replace two standard transverse springs of former models. The torque tube drive has been replaced by semi-elliptic rear springs which take up driving force. Springs are interleaved and need no lubrication.

Lowered body and center of gravity result from use of two universal joints and hypoid rear-axle gears. Overdrive is optional. The '49 V-8 engine develops peak output about 200 rpm. lower than in previous engines.

Engine design stresses accessibility. Exhaust pipe emerges from the front end of the left exhaust manifold, passes under timing gear case, and joins with the front end of the right manifold. Distributors and coils are high on the block at the front. Oil filler pipes are atop block at rear.

Pressed steel bell housing is used in place of cast iron. Engine is supported far forward on two mounts. Tubular shock absorbers inside the front coil springs are held in place by a demountable plate.—Am Auto, Jn, 41

Ultrasonic Inspection

Newly developed modification of Sperry "Supersonic Reflectoscope" testing inspects welds for lack of bond, inclusion, or voids. The method, known as angle beam transmission, employs ultrasonic, or high-frequency, waves entering the welded part at an angle.

The angle searching unit is placed on a cleaned area parallel to the weld and moved in a V-shaped path along the area. Any voids or inclusions in the weld reflect part of the ultrasonic beam back to the searching unit. The reflected beam is amplified to provide a vertical deflection of the horizontal trace on an oscilloscope screen.

A time marking system allows accurate calibration to determine the distance between searching unit and flaw, making it possible to distinguish between defects in plate and those in welds.—Weld Eng, Jn, 33

XS-1, XF-86, U. S. Planes, Pierce Sonic Barrier

Both the XS-1, a rocket-powered research plane, and the XF-86, experimental USAAF fighter, have pierced the sonic barrier. The XS-1 reached Mach number 1.0 in a steep climb Oct. 14. It has flown even faster since. The XF-86's flight past the barrier was a dive.

The bullet-shaped XS-1 was the first to reach Mach number 1.0. It is capable of sustained flight for only 2½ min. It features extreme wing and tail thinness. Surfaces are not swept back. Wing span is 28 ft., length 31 ft. It carries 8,000 lb. of fuel.

Standard G. E.-Allison J-35 (TG-180) axial-flow turbojet develops 4,600-lb. static thrust for the XF-86 (see McG-H Digest, May, p. 30). Two prototypes of the plane will be equipped soon with TG-190's developing 5,000-lb. static thrust and over 6,000-lb static thrust with water injection. The plane is designed for a top speed of 1,800 mph. It carries six .50 cal. machine guns, several light or two 1,000-lb. bombs, additional ammunition packages, or jettisonable fuel tanks.

Jettisonable tanks may be located at fuselage instead of on wing tips because of instability of swept-back wings. The swept-back wings reduce drag one-third. —Aviation Wk, Jn 14, 11

Dry Blocks Form Strong Wall

Dry-laid concrete blocks, laid without mortar between them, make a strong wall when sprayed with Jet-Crete, an air-applied concrete facing. After testing the dry-laid walls, the city of Dallas, Texas, approved the construction for building there.

In tests, an 8 x 10-ft. wall, made of 8 x 8 x 16-in. blocks and sprayed on both sides with a ¾-in. layer of Jet-Crete, withstood a live load of 275.5 lb., plus a dead load of 38 psf. A 23 x 47-in. test panel, dry laid, failed at 11,500 lb. while a conventionally-laid panel failed at 4,400 lb. This test block was coated 0.51 in. on one face and 0.92 in. on the other. —Cons Meth, Jn, 96

Aerial Cable Combats Rising Repair Costs

Increased repair and maintenance costs on open-wire distribution induced Southern California Edison Co. to try 3-phase aerial cable. Initial installation of 7,600 ft. of 5-kv. non-shielded, reverse-lay, self-supporting cable was made adjacent to a windbreak of eucalyptus trees.

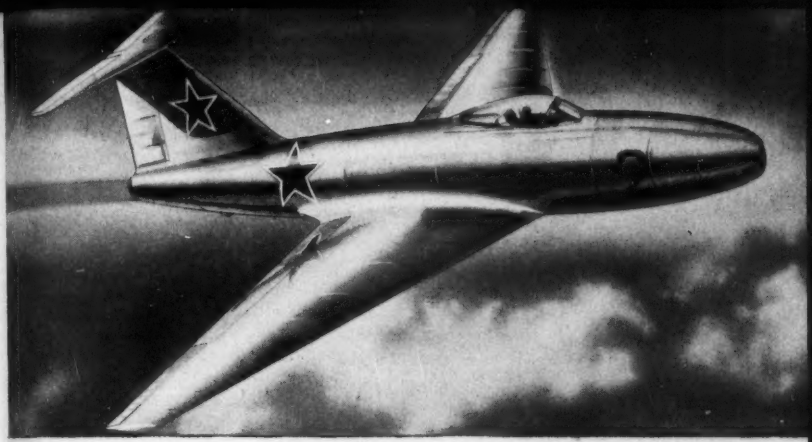
Savings in tree-trimming costs alone will more than pay annual carrying charges. Added advantage is greater reliability leading to uninterrupted service.—Elec West, May, 72

Simplified Method Makes Preliminary Estimates

Preliminary cost estimates for chemical plants are easily approximated by a simplified method based on delivered equipment cost and varied to include solid process plants, solid-fluid process plants, and fluid process plants.

Delivered cost is multiplied by 1.43 to give installed cost including foundations, supports, chutes, vents, insulation, and installation. Installed cost multiplied by 1.10 for solid processing, 1.25 for solid-fluid processing, and 1.60 for fluid processing gives installed cost of equipment and piping. This multiplied by 1.5 gives total construction cost.

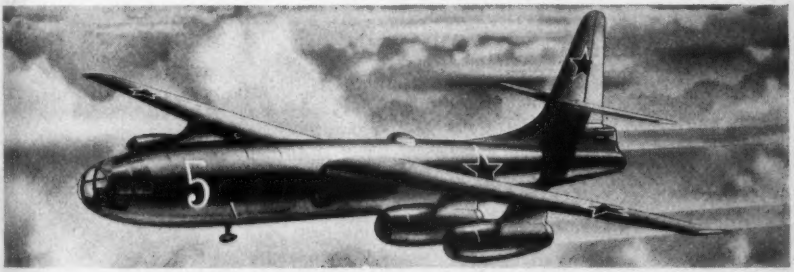
Overhead cost is obtained by multiplying construction cost by 31% for solid, 35% for solid-fluid, or 38% for fluid processing. This added to construction cost is the total estimated cost. Difference between costs from simplified method and estimate prepared from flowsheets and layout drawings should not be more than 10 to 15%.—Chem Eng, Jn, 112



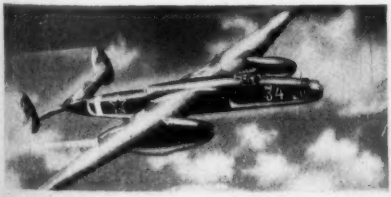
STARTED by the Germans, the DFS 346 has straight-through air flow intake at nose in one model, at fuselage side in other. Note swept-back wing and tail.

Soviet Jets for Supersonics

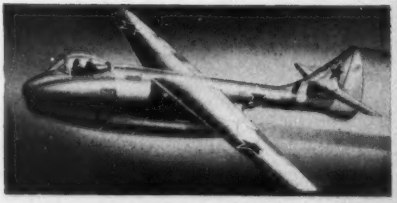
Sketches are based on movies taken at the Moscow May Day celebration. DFS 346 is said to fly "at the speed of sound."—Aviation Wk, Jn 14, 14



FOUR-JET BOMBER Ilyushin resembles the U. S. XB-47. Nacelles are suspended from very thin wings. Tricycle landing gear retracts into fuselage.



TUPELON, light bomber, nacelles are believed to be Junkers 13-stage axial flow units.



MIKAYAN jet fighter uses a single turbojet. Bulge below empannage is unexplained.

LOST-WAX PATTERNS

When wax-pattern requirements are high, Allis-Chalmers Mfg. Co. casts them in water-cooled molds in this automatic-cycle machine developed by the company. Operator lubricates molds with mixture of alcohol and liquid soap, and starts cycle by push-button. Molds are closed by 15-ton Hannifin air toggle press; wax at 170° F. is injected under 1,000-psi. pressure and allowed to cool; wax gun is refilled; and molds are opened automatically. Use of machine raised production on one pattern from 110 to over 1,000 per 8-hr. shift.—Am Mach, Jn 3, 83

Trend Toward Mass Vacations

Trend toward plant-wide shut downs during mass vacation periods is gaining favor. Companies have found it hard to maintain a high productive efficiency when key personnel were away under staggered vacation system. Complete shut down permits major repair and maintenance to be done without interfering with production.

Manufacturers in highly competetive industries are hesitant to follow the trend for fear they will lose rush orders. Continuous-process industries also may find it a costly procedure.—Business Wk, May 29, 19

Poor Coordination, Dreams Cause of Most Bus Accidents

Lack of physical coordination or inattention on the part of the bus driver, or both, are the cause of most bus accidents according to records of the Greyhound Lines. With this as a basis, Greyhound established a selection system for new drivers with heavy stress on physical and psychological testing. Now shorter periods of training are necessary, employment turnover is lower, and fewer accidents occur.

After an application is received, the applicant is interviewed by the regional manager or supervisor. He then takes a preliminary driving test to check his ability to handle heavy vehicles. The physical exam, which follows, stresses ocular and auditory acuity. The 5½-hr. psychological test follows.

Over this hurdle, the applicant attends a driver's school and must pass a written, as well as practical, test before going on the road.—Bus Trans, Jn, 73

Drill Water Connections

Using an air compressor, air drill, and water pressure, the Woodstock, Ontario, Public Utilities Commission has devised a method to drill horizontally to install water services. Also used are sump pump, angle-iron platform for drill, and 7-ft. opening trenches across water main and at curb box.

Trench is excavated, main is drilled and tapped, and a corporate cock inserted. Air drill is then aligned in trench and the drill connected by hose to the corporate cock. Drill operates at 160 rpm., under 90 psi. of air. Water lubricates drill path, washing borings back through hole. Drill is moved forward by forked lever set in holes along drill platform. After hole is bored, copper pipe attached to drill shaft is drawn back to the main.—Eng News Rec, May 27, 104

Drilling Continues in Search of Underseas Petroleum

The first deep-water oil well (operating in 50 ft. of water off Louisiana in the Gulf of Mexico) has struck oil-bearing salt rock at 8,000 ft. Humbolt Oil & Refining Co. is prepared to go to 15,000 ft. for oil. Exploratory methods are similar to those used on land. Oceanologists and weather experts determined expected ocean conditions in the area. Then a rig was designed to meet all expected weather conditions—hurricane winds and 35 ft. waves.

Platform is 206 x 110 ft. and is moored 8 miles off shore. Unit is self-contained, the 54-man crew living on the rig for five days at a stretch. Radiotelephone contact is maintained with shore station.

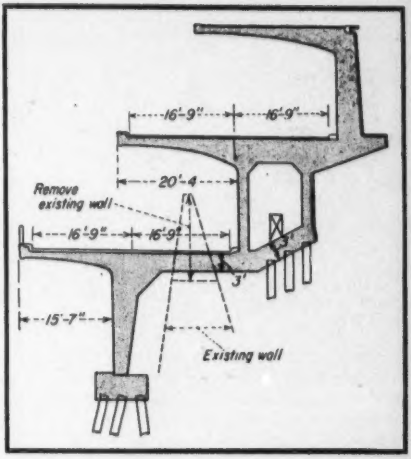
Biggest problem being faced is not physical, but legal. The U. S. Supreme Court recently ruled that the Federal Government has "paramount rights in and power over" tideland oil fields.—Business Wk, Jn 5, 39

Injection Molding Progresses

Only a few years ago, a 4-oz. injection machine was considered large. Early last year saw 16-oz. machines; this year 50-oz. models. Rumored are moldings up to 10 lb.

Multiple injection is now in volume production. Plastic material is injected into one mold for the basic part. This cools quickly and is transferred to second mold for a shot of second color or material. This permits production of intricate pieces in two or more colors without cementing or other expensive fabricating.

Molding rates are rising too. In a late model machine, the spreader is heated independently of cylinder wall. This gives faster molding, better temperature control, lower pressure loss, and easier disassembly and cleaning.—Prod Eng, Jn, 104



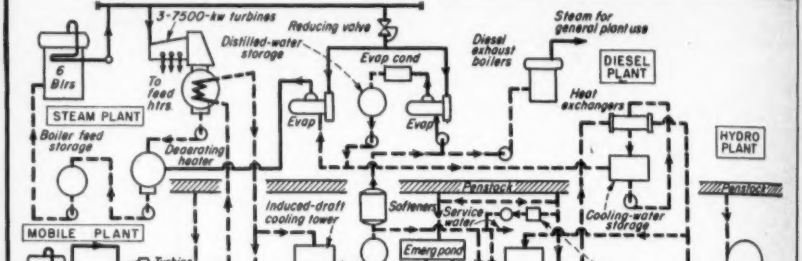
CARRIES HILLSIDE EXPRESSWAY

This 3-level cantilever structure will carry an expressway along the Brooklyn water front hillside. Access to dock area on street below will not be obstructed. Lowest level, carrying three lanes of south-bound traffic, overhangs the dock-level-street by 15 ft. 7 in. Remainder of the road rests on fill. The middle lane, three lanes north-bound, extends 20 1/3 ft. over roadway beneath. The top level is a 23-ft. 7-in. pedestrian promenade. Structure is designed as a reinforced-concrete rigid frame supported on pile footings.—Eng News-Rec, May 27, 79

Molasses from Wood Waste

Results of pilot-plant production of molasses from wood wastes have been announced by U. S. Dept. of Agriculture. Process consists of pressure hydrolysis of wood chips, using dilute sulphuric acid at high temperatures. Sugar solution is neutralized and concentrated.

Molasses obtained is bitter, but suitable as substitute for blackstrap molasses for stock feed and industrial purposes. Yield is 150–190 gal. of 50% strength per ton of wood. Production costs are estimated at $13.20 to $17.60 per ton of molasses at a wood cost of $2.20 to $6.60.—Chem Eng, Jn, 105



COMMON WATER SYSTEM, from canal and wells, connects four plants—steam, diesel, hydro, and mobile steam—into a well integrated, efficient operation

Steam, Diesel, Hydro Combined

Three power generating methods are combined in an ingenious system to meet rapid load growth problems with relatively scarce water conditions

STEAM, diesel, and hydro equipment are integrated, by the Salt River Valley Water Users' Association at Phoenix, Ariz., into a unique, efficient system at its Cross Cut plant. Many unusual arrangements provide maximum utilization of water and fuel.

The steam plant has three integral-furnace boilers, each rated at 100,000 lb. per hr. at 450 psi, and 750° F., and three 7500-kw., 14-stage turbines. The diesel plant has two 7,000-hp. double-acting, two-cycle diesel engines, operating 80% of the time since installation. The hydro plant has three 800-kw. and one 3,000-kw. generators, plus a 9,000-kw. frequency changer.

The mobile plant is a temporary unit. It consists of a complete 10,000-kw. condensing steam plant and all auxiliaries. This 6-car unit was leased from the Navy to meet an emergency in power shortage.

All these plants are tied in on one common water system. The diesels operate with a closed cooling system, served by a natural-draft cooling tower, with three heat exchangers. Makeup water comes from two sources: (1) wells supplying an emergency pond and (2) the canal at the hydro-plant penstock. It is screened and sand-filtered before admission to towers.

Circulating water for steam-plant condensers normally comes from an induced-draft cooling tower, but can be pumped from the tailrace. Water discharged from condensers passes through a waterwheel at the tailrace, generating about 70% of power for extra pumping.

Makeup water for the steam plant is drawn from a storage pond, sandfiltered, and softened. It is then evaporated, and distilled water is stored in the boiler-house. A second evaporator draws from distilled-water tank to supply the boilers.

This treatment has kept scale problems

to a minimum. Internal boiler surfaces are virtually as clean as when they were installed, and boiler blowdown has been reduced to practically zero.

Turbines have three bleed points. Lowest-stage bleed supplies tubular heaters, middle-stage deaerating heaters, and highest-stage tubular heaters. Makeup from evaporators enters deaerating heaters. Condensate is pumped first through steam-jet air-ejector condensers and then through the 13th stage heater to the deaerator.

A booster pumps the condensate from deaerator to a hotwell from which boiler-feed pumps take their suction, discharging through the 4th stage heater to the boilers. The 4th stage heater condensater is trapped back to the deaerator, and 13th-stage heater condensate back to the condenser.

Steam for general plant use is now generated in waste-heat boilers, utilizing diesel-engine exhaust. A future change to exhaust economizers, which will replace the last stage of feedwater heating by bled steam, is expected to increase turbine output by about 1,500 kw., with the added capacity costing less than $30 per kw.—Power, Jn, 90

Continuous Cheese Processing

Manufacture of process cheese at Borden Co. begins with a batch process and finishes on a continuous basis. American Cheddar, after slicing and grinding, is blown by an air conveyor to two melter-mixers, or cookers.

The air conveyor delivers cheese in a fluffy form that insures uniform heat treatment. Each cooker is a stainless-steel jacketed trough in which a screw with flights forces the cheese from filling to discharge end. Steam inlets along sides of cooker direct live steam into mix to form a homogeneous smooth mass.

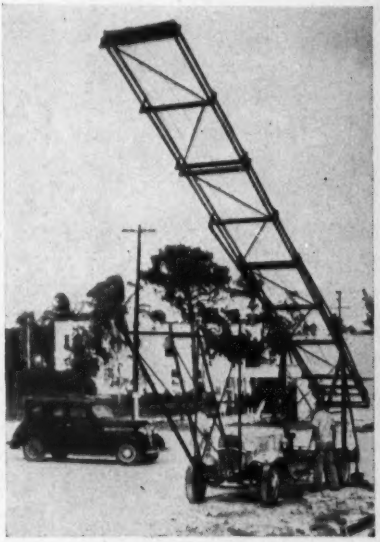
Melted cheese then runs into a hopper from which it is fed into coated cellophane pouches and automatically wrapped.—Food Ind, Jn, 114

New Dyeing Technology

"Fountain" or "cascade" skein dyeing machine, operating on the Buhlmann spindle principle, does not move yarn through dye liquor, the liquor being pumped through the spindle. Process is advantageous in dyeing rayons as subsequent winding operations are simplified. The skein does not rest in liquor.

Rate of flow of liquor through packages has been increased to 3–3½ gpm. per 1-lb. package on the average. This flow appears to be optimum.

Packages now average 22–24 oz. instead of the previous 1-lb. believed to be maximum possible. — Textile World, Jn, 131



SAVES SCAFFOLDING TIME

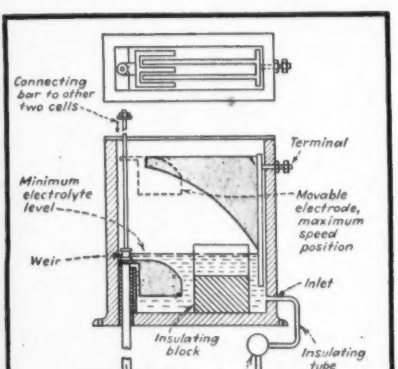
Scaffolding and elevator-building time is reduced by this portable elevator used by Richardson Construction Co. Mounted on a truck, unit can be raised to 40 ft.; is ready for use in less than an hour. An 8-hp. motor can raise a 700-lb. load up to fourth floor construction work.—Business Wk, May 22, 32

British Researchers Push Gas Turbines for Autos

Two British companies—Rover Co., Ltd., and Centrax Power Units Ltd.—have working models of gas turbines for automobiles, buses, and trucks. The Rover unit, 100 hp., has been run on test for 60 hr. It is rumored that it also has been road tested. The Centrax 160-hp. unit was displayed at the British Industries' Fair. Both units are scaled-down versions of aircraft engines but use two instead of one turbine.

One turbine drives the compressor, the second supplies power to wheels. Kerosene is used as fuel in both. In the Rover unit, a single combustion chamber is employed; in the Centrax unit, a series of chambers are arranged around the engine. Two turbines are used to increase torque for starting (achieved by low and second gear on conventional engines). The 2-turbine type compressor operates independently of the vehicle's load and power requirements.

Rover engine (See McG-H Digest, July, p. 37) turbine wheel is 5-in. dia. It runs at 55,000 rpm., may go 70,000 rpm. Length is 36 in., width 18 in., height 20 in. Centrax engine delivers 160-hp. at 35,000 rpm. Compression ratio is 5.8:1. Compressor blades and casing are aluminum alloy, combustion chamber is nickel-chrome alloy.—Business Wk, May 29, 66



COMPACT LIQUID RHEOSTAT

New liquid rheostat regulates length and area of current path between electrodes by changing electrolyte level, thus providing a wide range of resistance. Electrolyte (sodium carbonate) enters cell by insulating tube, fills it to level of weir, and overflows to reservoir to repeat the cycle. With weir in lowest position, current path through electrolyte is longest. As weir is raised, liquid level rises, thus decreasing conducting path until electrodes intermesh at upper limit to give minimum resistance.—Prod Eng, Jn, 139

Bulk-Handling Problems

Damage to material being handled and damage to bulk-conveying equipment are hazards to avoid in specifying such equipment. The first hazard applies especially to pneumatic conveying where material travels through the duct at nearly a mile a minute.

Storage also requires careful study of physical characteristics of the material. Fragile granular materials and briquettes, for instance, may be damaged by the drop into a storage bin. Solution with a continuous flow elevator is to have successive discharge openings along the vertical run.

Belt conveyors are vulnerable to costly damage unless suitably installed and maintained. One essential is thorough cleaning of the belt face after it rounds the head pulley, so buildup on return rolls will not force belt out of line and into contact with supports.

Heavy lumpy materials may also damage the belt by impact during loading. Cushioning by rubber pads under idlers or multiple pneumatic-tired rollers can prevent any such damage.—Chem Eng, Jn, 118

Soviets Plan Steel Center For Leningrad Industry

To serve industrial Leningrad, the Soviet Union is planning a large iron and steel center—location not definitely set—to produce 4-4,500,000 tons of pig iron and 4-6,500,000 tons of steel. This will represent about 10% of Russia's capacity in 1960.

First units, to be completed by 1950, will be two blast furnaces, producing 1,200,000 tons of pig iron; open hearth capacity of 2,220,000 tons; and a 1,600,000-ton blooming mill. The complete project, to be finished by 1960, also will contain two blooming mills and plants for electric steels, rolling, forging, and heat treatment.

Cherepovetz, 280 mi. east of Leningrad, appears to be the most probable site. It's near large peat deposits and the Drozdon hydroelectric project. Annennsky Most and Ladenoye Polye are also location possibilities.—Eng & Min J, Jn, 92

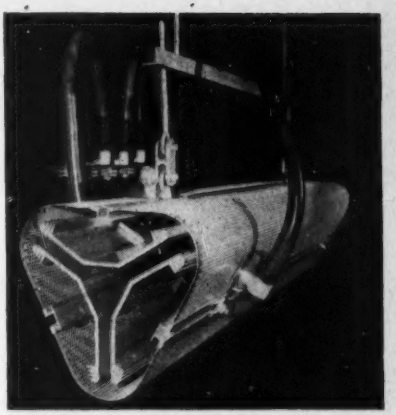
New Foundry Developments

Interest at annual exhibit of American Foundrymen's Association was captured by equipment designed to make foundries better places in which to work.

Pangborn Corp. showed its Continuous-Flo Rotoblast in which castings are dumped on conveyor, transported into a spiral-drum barrel for blasting, and discharged as clean work. American Wheelabrator Co. has a similar machine.

Yale & Towne showed a fork truck with rotating attachment to hold a large ladle for pouring molds. Fox Grinders now has a swing-frame machine that uses flexible grinding wheels for cutting sprues and risers, while Standard Electrical Tool Co. has a double-wheel machine with independent motors for snagging.

Among other exhibits were Whiting Corp.'s Hydro-Clone dust collector and Induction Heating Corp.'s new plastic drying plate for handling small fragile cores in its conveyor-type core-baking oven.—Am Mach, Jn 3, 126



NOVEL LOW-REACTANCE BUS

Main conductor of 440-v. system at new rolling mill of Aluminum Co. of America is a 3-phase, 3,500-amp., low-reactance bus of triangular design. Each of three conductors is an extruded aluminum sector with 120° wings. Each sector has four fins at outer edges to dissipate heat, and all sectors are separated by insulators. Bus is hung vertically from roof. Reactance of bus is 40% of that of bus consisting of two 7-in. channels arranged in hollow squares for each phase with phases at 12-in. centers.—Elec World, Ap 24, 81

Shovel Speeds Shaft Mucking

Mucking is probably the most tedious and time-consuming operation in shaft sinking. But a new machine, operating on the shovel loader principle, will make shaft sinking simpler. The new unit, built in the shops of New Park Mining Co., is used for loading broken rock into a 21-cu. ft. sinking bucket. It is operated in the center compartment of the shaft. Consisting of a cage about 10 ft. high, digging and loading assembly is attached to the bottom of the cage by a steel A-frame.—Eng & Min J, Jn, 83

Skoda Becomes Czechs' Industrial Economy Anchor

Before the war Czechoslovakian industry was anchored in light industries—textiles, glass, and small manufactured goods. Now heavy machinery and machine tools are the basis of the country's industrial economy under Soviet supervision. Skoda Works is the backbone of the Czech economy.

Owned by the state—as are all Czech industries employing more than 50 persons—Skoda plants have all been rebuilt and are producing to capture the prewar business formerly held by the Krupp empire.

About 40% of Skoda's production goes to Russia and Russian satellite countries. Machine-tool production is now 2,645,000 tons as compared to 1,374,000 tons in 1937. Steel, castings, and rolled-products output are also up.

Shipyards on the Danube have just launched ten welded-hull, 1,000-ton barges. Ten more are under construction. A new miniature mechanical shovel has been developed at the Pilsen works. The 20-ton unit digs trenches and ditches, packs and rams soil, and can drive piles.

At Pilsen, labor force—25% women—works on an 8-hr. shift per day, 6 days a week.—Business Wk, Jn 12, 114

All-Aluminum Bridge

Contract for a 504-ft. all-aluminum highway bridge in Quebec, Canada, has been awarded, the 400,000-lb. bridge weighing one-half as much as a similar steel structure. Main span will be of fixed type arch construction, span being 290 ft. center to center. Bridge is to carry a 24-ft. roadway with 4-ft. sidewalks on either side. Aluminum is Alcan 26-ST alloy.

Main arch will be composed of two 54 x 9/16-in. aluminum web plates, with four angles 6 x 4 x ⅝ in. and two 32 x ⅝ in. cover plates forming a closed box section. Deck and sidewalk will be precast concrete slabs, reinforcing being welded in the field and then grouted. Road wearing surface is to be asphalt placed over concrete slabs.—Eng News-Rec, Jn 3, 3

Stock Governs Card Speed

If raw material to be converted into roving is considered, many carding problems can be avoided. In running very long fibers, like mohair, main-cylinder speed should be reduced and speed of workers increased. This will open stock and lay fibers parallel. A smoother web results.

In working blends of short fibers, workers should be slower, to prevent short stock from going to waste. If short stock is carded at high speed, roving is weakened despite added twist.

Mills equipped with 3-cylinder cards only are likely, occasionally, to run very fine fibers, over 70s or cashmere. A 2-cylinder card would suffice, as fine fibers do not need so much carding. If 3-cylinder card is used, carding must be done slowly.—Textile World, Jn, 127

Needs Constant Temperature

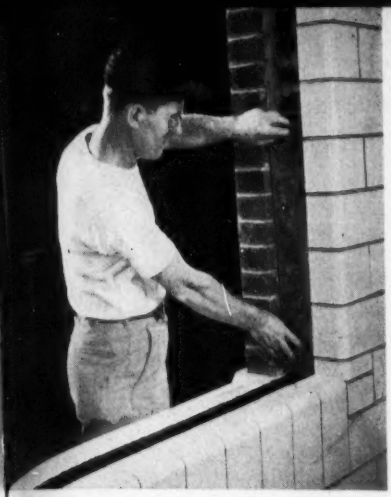
Heat control is of paramount importance in candy making. In a new Fanny Farmer candy studio in New York City, chocolate and cream temperatures are held constant by using 1,000-w. heating units around chocolate dipping and bon bon pots and enrobers.

Chocolate in circulating pipe lines is heated by induction heating cables running parallel to the pipe lines. Heating is accomplished by making the chocolate-carrying piping one leg of the adjacent induction circuit.

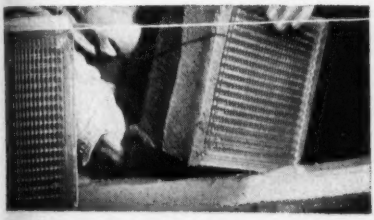
Suitable controls—aquastat, transformer, switches, and relay panel—insure constant consistency of the chocolate as it travels to dipping areas.—Elec C&M, Jn, 62

Tricks in Laying Glass Blocks

Laying up glass block building walls is a simple operation if done correctly. From American Structural Products Co.'s training film "Mortar and Glass," several tricks are shown for ease in construction.—Cons Meth, Jn, 92

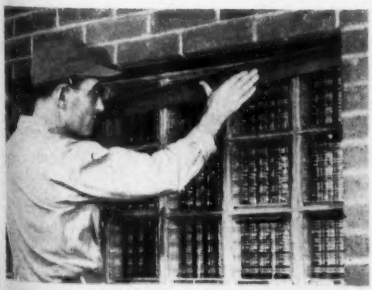


1 ASPHALT EMULSION is troweled on sill and bottom expansion joint 1/32 in. thick. Glass fiber material is fastened to vertical face by asphalt. Strip must contact sill. First block must be set true. Use level.



2 MORTAR is buttered thick on top of last row laid and on edge of new block. Crown to fill corrugations in dry edges. Level string is used to guide setting.

3 WELDED WIRE reinforcing strip is laid full length on horizontal joints at regular intervals—here every third row. Wire is pushed down into soft mortar.



4 BEFORE top course is laid, glass fiber expansion joints are affixed to underside of lintel with asphalt. Clearance must be left between top of block and joint.

5 AFTER BLOCKS are set, removable lintel angle is fastened to inside of face of panel, forming top chase. Fill joint between blocks and masonry with oakum packing.

AUTOMATIC WELDING

Twelve mounting brackets are welded to each end of washing-machine tub at F. L. Jacobs Co. in specially designed resistance welder. Tub is mounted on expansion arbor having 24 electrodes in parallel and rotated by geneva motion. Brackets are fed from magazine and held by electronically controlled air clamps. Arbor is expanded by 12 manually controlled air cylinders, and welding heads are powered by electronically controlled air cylinders. Fully automatic cycle takes 22 sec.—Am Mach, Jn 17, 104

Quiets Brake-Drum Noise

Flexing brake drums or out-of-line drums on the front wheels and ribbed drums on the rear are the most frequent causes of brake noise. Plain drums should not be used on front and ribbed on rear, because the forward drums grow in diameter, throwing most of the work of braking on the rear drums. Noise, faster lining wear, and excessive tire wear result.

Brake shimmy may be caused by plain drums flexing nonuniformly as wheels turn. Rigid, rib-type drums will eliminate this. They should be used on all wheels for maximum benefit. Ribbed drums also offer more positive braking action with less cam control, hence less brake adjustment.—Bus Trans, Jn, 61

Synthetic Fuels Move to Competitive Position

Early in 1950 synthetic fuels will be produced on a commercial scale in the U. S. Increasing demand for petroleum products is driving millions of dollars a year into research and development, their objective being to produce synthetic fuels at a competitive cost.

Most recent data (see McG-H Digest, F '47, p. 15 and Jn '47, p. 8) indicate higher costs than expected. But synthetic gasoline from natural gas will compete with gasoline from conventional petroleum refining, according to these data. Based on natural-gas cost of 10¢ per 1,000 cu. ft. and petroleum cost of $2.78 per bbl., gasoline from natural gas should be about 1¢ per gal. less—estimated at 12.8¢ per gal. as compared with 14.1¢ per gal.

Gasolines from coal gasification and from oil shale are expected to be 3–4¢ higher than others. Available evidence indicates coal hydrogenation to be too expensive to be competitive.

Significant fact in synthetic-fuel processing is that manufacturing costs run 70–75% of total cost. Better methods therefore should reduce costs appreciably. Also, gasoline from petroleum is much more susceptible to change in raw-material prices than are gasolines from other materials. As petroleum prices are on the way up at faster rate than other raw materials, synthetic fuels gain.—Chem Eng, Jn, 131

Detects Metal in Cows

Being coarse feeders, cows are liable to swallow small pieces of wire or other metal with possibly serious results. A British-made Cintel detector enables quick diagnosis to be made. It also can locate pipes buried up to 2 ft. 9 in. in the ground or small pieces of metal embedded in timber.—Electronics, May, 128

Adjust Brine Level in Refrigerating Plant

Float-controlled valves for adjusting the brine level in large refrigerating plants are satisfactory under steady condensing conditions. But they can give trouble when plants must operate over a wide range of condenser cooling-water temperatures, with a corresponding range in liquid pressures. Another disadvantage is their fixed position, which makes it difficult to change liquid level.

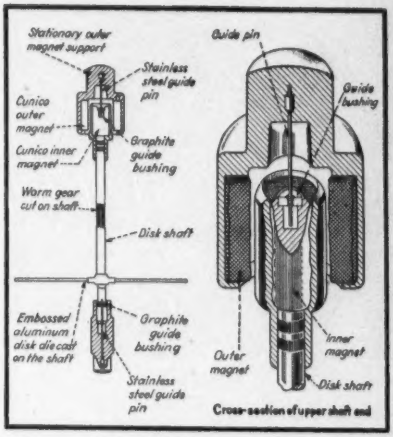
Solution is to install a movable photoelectric cell to control the level. A specially designed gage glass on the accumulator shows the liquid level in the brine cooler. The lower end of the glass connects to an oil pot; with this hookup, oil level in the glass represents refrigerant level in the accumulator.

A lamp is mounted on one side of the gage, a photoelectric cell on the other. Both are adjustable vertically. The instrument is connected to a solenoid expansion valve in the liquid line, which also has a hand-operated bypass expansion valve.

By setting the hand-operated valve to pass 60-70% of the required liquid and controlling the solenoid valve by rise and fall through the light beam of a float in the gage glass, the liquid can be held within an inch of any desired level.—Oper Eng, Jn, 44

New 'Copter Flight Control

Daniel R. Zuck has designed a co-axial helicopter to fly like a pusher plane. Rotors are of unequal diameter and tail rotor swings 90°. For high-speed flight, large rotor is feathered, small rotor freewheels, and tail propeller provides maximum available thrust. For maximum lift and dead-stick landing, large rotor is unfeathered and maximum power applied to direct lifting rotors; tail propeller is swung to side to offset torque of unequal rotors.—Aviation Wk, Jn 5, 25



OUTER AND INNER magnets provide support for disk by their opposite axial polarities

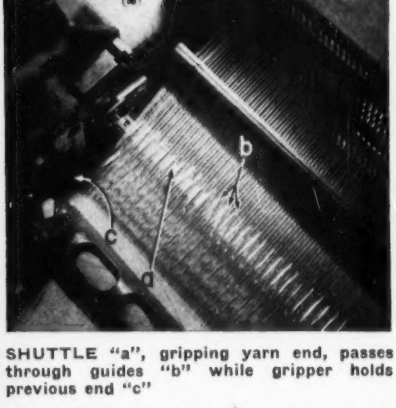
Watthour Meter Features Magnetic Suspension of Disk

Magnetic support of moving element in new General Electric watthour meter eliminates jeweled bearings.

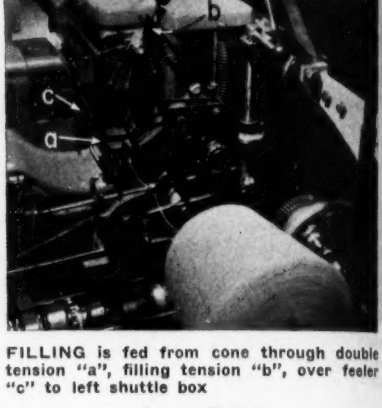
Two cylindrical permanent magnets of a high-coercive material, cunico, are placed one within the other. The outer magnet is fixed to the meter frame, the inner one to the upper end of the disk shaft. As magnets are magnetized axially with opposite polarities, resulting field supports the rotating element.

Stainless-steel guide pins keep the moving system in line by graphite guide bushings, at both ends of shaft, that run on the guide pins. Friction and wear in the system have been kept low by reducing side-thrust forces to a minimum.

The reduction has been achieved by locating the small C-shaped damping magnets closer to the electromagnet than is possible in a conventional meter, by embedding them as inserts in die-cast frame. This makes them immune to demagnetization from lightning currents. —Elec World, Jn 5, 104



SHUTTLE "a", gripping yarn end, passes through guides "b" while gripper holds previous end "c"



FILLING is fed from cone through double tension "a", filling tension "b", over feeler "c" to left shuttle box

Bobbinless Weaving Machine

Warner & Swasey machine is the Swiss-built Sulzer unit. Many standard parts eliminated. Method of filling, selvage formation outstanding innovation

FIVE PROTOTYPES of the new Warner & Swasey bobbinless weaving machines* have been placed in mills for further testing. The weaving machine was first built by Sulzer Bros., Switzerland, and development has subsequently been carried out by Warner & Swasey. Tooling for volume production is under way.

The unit will operate at speeds from 210 to over 240 picks per min. The 110-in. prototype has produced cotton broadcloth at 240 ppm. Single or multiple fabric widths have been produced, their total width being 110 in. less 1 in. for each tucking unit. Up to eight harnesses can be accommodated on the 5x15½-ft. unit.

Design will permit elimination of many adjustment and supply problems. Completely eliminated are bobbin-winding, battery or shuttle filling in its present form, shuttles, shuttle-furring, bobbins, and bobbin polishing. Pick motion is eliminated from the pick cam and ball to the picker, including picker stick, check straps, lug straps, pick shoes, parallels, and plugs. No leather or cord is used; only wood is in harnesses and cloth roll.

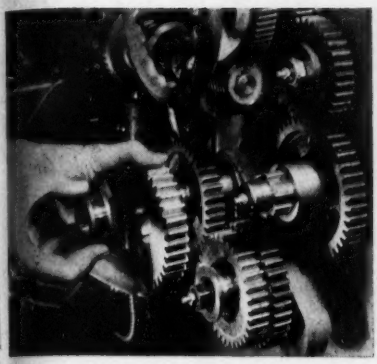
Outstanding innovation is in the method of filling insertion and selvage formation. Prototypes are single-color-filling type, using a small metal yarn carrier as a shuttle, but no bobbin. Filling yarn is unwound from cone and laid across warp from one direction only.

Shuttle grips yarn and is picked through a series of metal guides to a receiver without touching warp. Pick is then cut and both ends are inserted into the selvage by a tucking needle. Filling is held at a predetermined tension. Empty shuttles return on a conveyor running under shed.

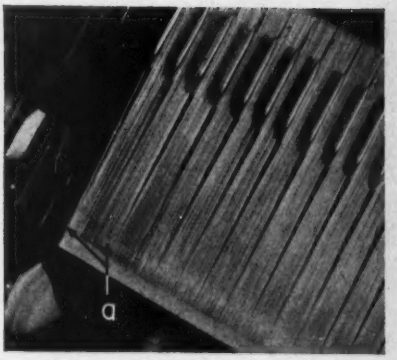
Filling cone is bracket-mounted outside the left side of the frame. Yarn passes through a Plexiglass guard which keeps lint off mechanisms. Steel shuttle is 3¼x½x¾ in. and weighs 1 oz.

After one pick is laid, sequence of operations is as follows: (1) feeder in left

* *Warner & Swasey uses the term "weaving machine" instead of "loom."*



TAKE-UP GEAR can be adjusted quickly and easily without a wrench. Spring-clip collars hold splined gears on shafts



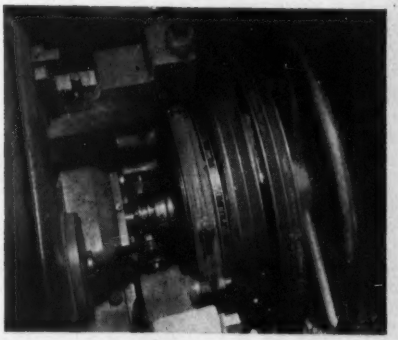
TUCKED-IN SELVAGE is formed by needle "a" pulling end of each pick into shed of following pick

box grasps left end of laid-in pick; (2) gripper also grasps left end of laid-in pick nearer selvage; (3) pick is cut by scissors between feeder and gripper as harnesses change; (4) gripper feeds end of laid-in pick to needle to be tucked into selvage; (5) feeder backs up to place end of new pick in shuttle; (6) pick is beaten in, tucking previous end into selvage; (7) shuttle opens to grasp new pick; (8) feeder opens to release end as shuttle grips new pick; (9) shuttle is fired through guides laying new pick in shed; and (10) process is repeated.

Shuttle is picked across shed by torsionally winding up one end of a 30-in. steel bar on which picker stick and steel picker shoe are mounted. Number of shuttles used at any one time varies with fabric width—a 109-in. piece of cloth was woven with 16 shuttles. If shuttle is not positioned properly in firing and receiving boxes, machine stops instantly.

Power is from a 3-hp. motor through four V-belts to a double-sheave pulley and clutch to main shaft which drives lay shaft through three enclosed, oil-bathed cams. Harnesses are positively driven both up and down by peripheral cams, each harness being actuated by two cams.

When machine stops, cause of stoppage



TIMINGS, settings, and positions are controlled by this indexing wheel. Double sheaves drive main shaft

can be determined instantly. If warp end breaks, harnesses are leveled by a single-revolution clutch. Loom cannot be started until harnesses are back in operating position. If filling breaks, shed remains open. Cause of stoppage is shown by numbers on the indexing wheel (See picture above).

Cloth take-up is on a positively gear-driven, corrugated-rubber-coated roll. Maximum cloth diameter is 16 in. Eight gears, in various combinations, permit

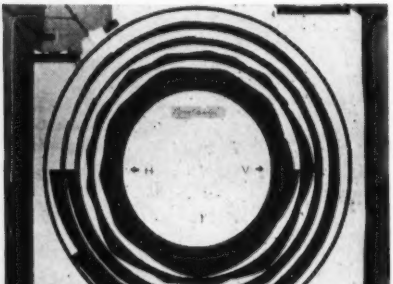
variation of from 10 to 160 picks per in.

Warp stop motion is electric with a sliding notched bar which can be operated from any one of four points. This speeds location of broken ends.

Two types of selvage are available. In tucked selvages, ends of each pick are pulled into the shed of the follow pick and are beaten into it. The twisted selvage is formed by twisting one or several pairs of selvage threads around each of eight consecutive pairs.—Textile World, Jn, 110

Bonus Brings Added Output

Only executives under contract are excluded under the Micro Switch Div., First Industrial Corp., "plus business" bonus system. Plan rewards employees for sales and production over and above the company's breakeven point. Breakeven point is fixed at that point where all primary expenses are paid.



POLAR HANDWRITING

Reproduction of a letterhead as a novelty display in electronic-equipment demonstration was done by plotting 240 points in each word in polar coordinates on 13-ft. circle, using separate tracks for vertical and horizontal components. Photographic transparency, made from polar plot, was mounted on motor shaft, scanned by light beams with phototubes receiving modulated light. Tube voltages were applied to two channels of oscilloscope to reproduce words on face of cathode-ray tube.—Electronics, Jn, 180

A 5-cent hourly bonus is guaranteed, but it is not the maximum. Top so far paid is 15¢ per hr. Ten cents or more per hr. has been paid more than half the weeks the plan has been in effect. Plant capacity appears to limit bonuses to a maximum of 15¢ per hr.

Bonus for each week is paid on the basis on shipments for that week plus the shipments of the previous three weeks.—Factory, Jn, 82

Pilot-Plant Aseptic Canning

Aseptic filling of cans, combined with short high-temperature sterilization, has focused canners' attention on a pilot plant now in operation and a full-scale trial planned later this year.

Most promising applications of this method are for fluid products, including chocolate milk, baby foods, juices, purees, puddings, cream soups, and evaporated milk. Advantages of short processing at high temperatures include better flavor, color, and texture of the product than can be obtained with low-temperature processing.

The pilot plant carries raw product through heating and cooling sections of heat exchangers, then to the filling equipment. Meanwhile cans are washed, dried, sterilized by superheated steam, and conveyed to the filler. Can covers are fed from a sterilizer to containers, which then pass through a closing machine.

The process has passed severe bacteriological tests. Results indicate that it is practical and dependable for continuous operation, but commercial feasibility is yet to be proved.—Food Ind, Jn, 71

Italian Air Line in Service

Linee Aeree Transcontinentali Italiane, Italy's government-backed air lines, will be in service before the end of summer. Line will use 4-engine SM 95's, now under construction.—Aviation Wk, Jn 14, 19

Special Equipment Designed for 11-Acre Roof Job

A gas-operated bridge crane, a rubber-tired dolly or jinnywinch, an extension frame on a fork-lift truck, and a toggle-clamped sling to handle slab units are used by a California contractor to place 11 acres of precast roof slabs. Per day, 5,000-9,000 sq. ft. of slabs are laid. The pumice aggregate slabs are 4 in. thick with grooved edges; standard units are 2½x10 ft. and weigh 500 lb. To reduce weight, 2⅝-in. holes are cored out with inflated rubber tubes during pouring of slabs.

Three roof types are involved: a saw-tooth, 40 ft. between ridges; flat section, at high and low levels; and odd areas varying in pitch and height.

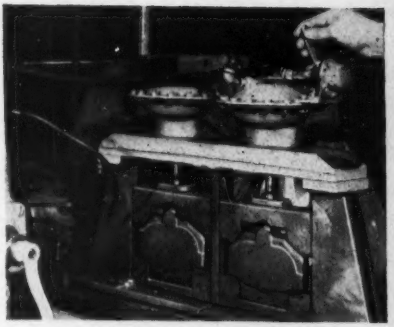
Saw-tooth area slabs are placed by a special bridge crane spanning ridge beams. Gas-engine traveling hoist lifts slabs from ground to deck level and then swings into setting position. Slabs for flat sections are raised to low levels by a fork-lift truck and to higher levels by an extension frame on the truck. Slabs are picked off the fork-lift truck by a 2-wheeled jinnywinch.

On odd roof areas, slabs are hoisted by a 120-ft. boom crane. After slabs are placed, joints are grouted; cored slab openings are closed with disk plugs before joints are sealed.—Cons Meth, Jn, 98

Resoles Trolley Shoes

Hard facing with low-temperature nickel-silver overlay is quick, economical way to repair shoes for trackless trolleys. The overlay work-hardens to 200 Brinell. Alloy is saved by welding the overlay onto a worn shoe with a general-purpose brazing rod.

First the top edges of the worn shoe are machined. The alloy is welded on the inside with the shoe on its side; then the shoe is turned over and welded on the outside. Finally, square edges are machined off. A 12-min. repair job means longer service than with a new shoe and at considerably less cost.—Weld Eng, Jn, 58



TAKES OWN MEDICINE

Bendix-Westinghouse Automotive Air Brake Co., manufacturers of air-brake operating devices, has applied Robotair cylinders to over 500 shop jobs. Here two separate Robotair units, each consisting of air chamber with a flat diaphragm and connected to compressed-air line, are mounted on a double milling fixture for cylinder heads. Milling output is increased 40% because of quicker loading and heavier cuts.—Am Mach, Jn 17, 112

Electronic Elevator Control

New electronic control for elevators, developed by Otis Elevator Co., will make installation simpler, eliminate many electrical and mechanical parts, require less wiring, and simplify maintenance. The first installation will be made soon in a new 21-story office building in New York City.

Passenger touches—not presses—the wall signal button, disturbing electrical balance in a small electronic tube. This lights the signal and sends a message to the penthouse nerve center which is relayed to the traveling car. The current continues to flow until elevator stops at the designated floor.—Business Wk, Jn 19, 58

TECHNICAL SHORTS

Measures Film Thickness—Radioactive Carbon 14 and a new gage developed by Goodyear Tire & Rubber Co. measure film thicknesses accurately to 0.00001 in. Film passes through a slot in gage and C14 passes current through it. Currents are amplified, operating a meter which indicates current strength. This also indicates film's thickness (See McG-H Digest, June, p. 15).—Business Wk, Jn 5, 56

Protects Cylinder Walls—Dodge Div., Chrysler Corp., reduces scuffing and scouring of piston rings, pistons, and cylinder walls by applying a coating to the walls. Manganese iron phosphate crystals make the coating porous so it can trap lubricating oil. Better lubrication and chemical properties of coating combine to help prevent local overheating and resultant flow or drag.—Prod Eng, Jn, 106

Charts Show Dosage—To avoid haphazard feedwater treatment, 20 calibrated charts have been developed that show what dosage is needed to maintain optimum internal conditions. They cover all commercial phosphates and alkalies, and simplify calculation of chemical feed based on determination of water hardness.—Power, Jn, 81

Cadmium Radiator—Cadmium plating instead of tinning on steel radiator parts is being tried by one automotive manufacturer. If successful as now indicated, it will save tin, reduce hand work, use less floor space, eliminate need for hot furnaces, and reduce heating and ventilation costs.—Am Mach, May 6, 113

R-F Heating for Cabinets—Gavan Woodcrafter Inc. applies radio-frequency heating for gluing of radio cabinets. Production rates have been high. One man applies glue, operates press, and splits the panels to turn out 400 front panels in 8 hr.—Electronics, Jn, 152

Frozen Eggs Remain Fresh—A new method, developed at Louisiana State University, keeps frozen eggs fresh tasting for more than a year. Eggs are processed for ½ hr. in a vacuum desiccator with a dehydrating agent, then placed in a freezing room held at 15-20°F.—Food Ind, Jn, 146

Locomotive-baggage Car Diesel—Milwaukee Railroad has designed a combination diesel locomotive and baggage car to pull short passenger trains—up to four cars. It is powered by two 1,000-hp. engines.—Business Wk, Jn 5, 24

SCANS MATERIAL EDGE

Edge scanner for use on production lines was developed by Langevin Mfg. Co. It scans edge of material passing between upper and lower housings of instrument, and actuates relay to operate corrective mechanism. Upper housing has lamp and lens, lower housing two photoelectric cells. Slots in adjustable shield plates over tubes permit only a narrow beam of light to pass. In normal operation, material edge lies between slots, shutting off light to one tube. Variation in edge position, indicating off-center movement, is immediately shown when normally covered slot is uncovered or the other covered.—Elec C&M, Jn, 71

Quick-change DC-4—Individually upholstered passenger seats in Braniff Airways DC-4's are placed along both sides of the fuselage facing inward. When part of plane is used for cargo, seats are folded up against wall. Curtain separates passenger and cargo sections. Carpeting, with transverse seams, can be converted to cargo flooring in a few minutes.—Aviation Wk, Jn 14, 43

Walking Excavator—Russia's first walking excavator is said to be producing 350 tons of coal per hr. in a test strip mine in the Ural Mts. Machine weighs 180 tons and is operated by one man.—Coal Age, Jn, 202

Consumable Pallets—It used to take 64 man-hr. to unload a freight car of 55-lb. zinc ingots at Oliver Iron and Steel Corp. Now using pallets of the same composition as the ingots, unloading takes 2 hr. Forty-eight ingots are strapped by steel tape to the pallets.—Factory, Jn, 131

Insect Control—Oregon State College warns that benzene hexachloride, while effective in pest control, causes off flavor in vegetables, poultry, and meat products. A. E. Michelbacker, University of California, emphasizes that stored-product insects can be controlled by keeping foods dry (below 8% moisture) and cold (40-50° F.).—Food Ind, May, W 34, W 35

Super Carrier—The U. S. Navy has received Congressional "go-ahead" on its plan to build a 65,000-ton displacement carrier, capable of carrying planes up to 75,000-lb. gross weight. Flight deck will be 1,090 ft. long. Armored, deck will be free of superstructure, to permit planes of wing span wider than the 190-ft. wide deck to operate from it.—Aviation Wk, May 24, 23

Cleans Mine Air—Carbon monoxide gas from underground mining equipment at Eagle Picher Mining & Smelting Co. is controlled by an oxygen tank mounted on rear of equipment. Oxygen is fed into exhaust manifold, inflammable gases being ignited. The harmless CO_2 is discharged into air.—Business Wk, May 29, 64

Slasher Tension Control—Constant tension on warp beam yarn, better weaving, and superior fabrics resulted from installation of multi-motor slasher drives at Reeves Bros., Inc. Varying speeds were obtained by an all-electric drive; production speeds were much higher than those of conventional slasher drives.—Textile World, Jn, 122

Light Heavy Crane—Capable of lifting 15 tons, a new heavy-duty crane designed by Dominion Bridge Co. has structural members entirely of high strength aluminum alloy. Crane weighs 51,700 lb. as compared to 84,000 lb. for a conventional crane of similar capabilities. This permits a lighter motor to be used.—Eng News-Rec, Jn 10, 70

Solves Heat Problems—Calculating machine developed at Columbia University can solve heat-flow problems readily. Thermal properties of materials are concentrated into individual electrical circuit elements by lumping their electrical analogs. Applications include problems on solidification of metal and glass castings, heat loss in furnaces, and airplane-wing deicing.—Electronics, Jn, 190

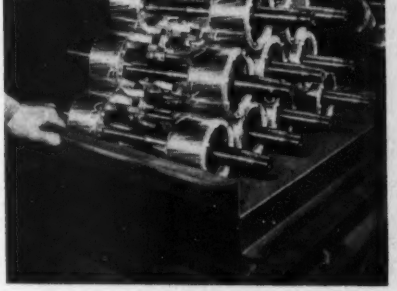
Unloads Lumber—To unload lumber trucks without splitting lumber, Penberthy Lumber Co. uses a hydraulic unloader. Arm and roller, pivoted on rear of chassis, support rear of load. Lumber is rolled back, hydraulic valve opened, and load rolls off gently. Truck is then moved forward until front of load rests on arm which then lowers load to ground slowly.—Cons Meth, Jn, 110

Linen-taped Cables—For the installation of a new transformer bank at Byron Jackson Pump Co., the contractor could not get the type of flexible joint needed to connect vertical copper busses with transformer terminals. Solution was to strip insulation off of two 1,000,000 CM cables, lay them side by side, and wrap with ten layers of oil linen tape as safety measure.—Elec C&M, Jn, 74

Radios Direct Snow Plows—Upper New York State highway department snow plows were directed by 2-way f.-m. radios during severe snows last winter. Each plow is equipped with both transmitter and receiver. Network covers 1,050 sq. mi.—Cons Meth, May, 105

Welds Silicon Bronze—Always difficult to weld by metallic-arc process because of hot shortness, silicon bronze is now quickly welded by use of coated aluminum-bronze electrodes. Good practice is to avoid overheating this alloy.—Weld Eng, May, 51

Cork Fungicide—Experiments by General Electric Co. indicate that salicylanilide as a fungicide is superior for cork to the conventional beta naphthol. The 5% solution was more effective than the 1% in providing immunity and inhibiting fungus growth.—Prod Eng, Jn, 107



REVERSIBLE PALLETS

Westinghouse Electric Corp. employs sheet-steel reversible pallets in production of Life-Line motors at its Buffalo plant. The 23-in. square pallets carry rotor-and-shaft assemblies on 24-in. wide roller conveyors, yet can be handled with standard lift trucks, stacked easily when not in use, and used on conveyor or with truck with either side up.—Am Mach, Jn 3, 88

BALCONY CONTROL center for welders and motors was established by . . .

Design for Maintenance

Circuit and equipment accessibility makes plant's electrical system easy to maintain and also reduces maintenance costs, an important budget item

ANNUAL MAINTENANCE cost of an industrial electrical system depends to a substantial degree on original system design. This factor determined wiring methods in the new Standard Tube Co., Detroit, plant for manufacture of welded steel tubing.

Primary, 4,800-v., 3-phase power is distributed underground to three outdoor substations. Two provide 480-v., 3-phase secondary service, while the third provides 480-v., single-phase service to eight resistance welders on the tube mills.

To eliminate overheating and burnout of welder-control electronic tubes, a single transformer is installed for each welder circuit. An outdoor bank of eight 4,800/480-v., single-phase units serves two indoor secondary cubicles, each containing four 2-pole, fused, dead-front disconnect switches. Conduit feeders lead from switch cubicles to balcony-mounted welder controls.

All motor control apparatus is kept off the production floor by concentrating it on special steel balconies installed between building columns. Distribution is made through an overhead section of bus duct.

Groups of conduits at mezzanine columns carry individual branch circuits under the floor to motor locations. Conductors from conduit risers to individual control units are housed in the natural raceway formed by the underside of the balcony platform structure.

Tube-mill control units, another example of design for maintenance ease, are pedestal floor-mounted behind the operator's station. Top of tilted control panel is hinged for ready access to rheostat connections, pushbutton units, and

terminal strips, while pedestal cabinet has hinged door for access to fuse blocks, terminal strips, and magnetic contactors.

Maintenance ease was also the prime consideration in design of the unique lighting system. "Smog" from tube-mill and forging operations would pocket in previously used high-bay reflectors, coat the lamps, and cut light output.

In the new plant, reflector lamps are mounted to shock-absorbing sockets on an octagon outlet box. Now the smog simply passes around the smooth lamp surfaces and out the roof ventilators. Estimated saving in fixture cleaning cost is $2 per lamp per month.—Elec C&M, Jn, 54

Serves Three-Line Monorail

To switch 1,300-lb. loaded racks between either outer and the center line of three parallel overhead conveyors, Kaiser-Frazer Corp. developed a sturdy barrel switch.

Operated manually, the 3-sided revolving fixture has two curved rails and one set of three straight rails. It can be rotated on roller bearings to any one of three routing stages. Automatic controls lock the fixture in position when switching rails are lined up with conveyor rails.—Am Mach, Jn 3, 108

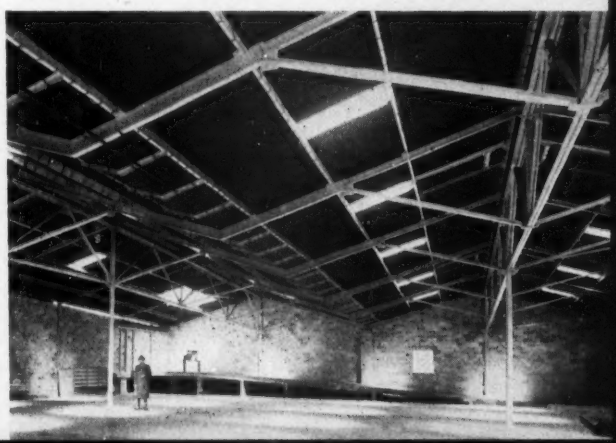
Pneumafils Aid Spinning

Installation of Pneumafil system for collecting ends down on spinning frames at Carlton Yarn Mills has reduced spinning costs markedly. Tests on 20 frames showed improved yarn quality, 30% fewer ends down in spinning, greatly reduced waste and fly, and increase of spinner assignments up 25%. Waste removal tests were run with fine cotton counts running from 40s to 120s. Executives believe system will pay for itself in two years.

System removes free lint and foreign matter from yarn as it leaves delivery roll, picks up roving strand if end breaks, conveys white waste to collector unit at end of frame. This waste is reused without waste-machine processing.—Textile World, Jn, 114

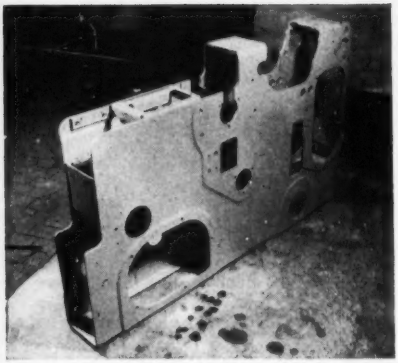
Must Rock-Dust Closer

Tests conducted by the U. S. Bureau of Mines show that current regulations requiring rock dusting within 80 ft. of the working face are insufficient. To keep explosions from spreading, dust—usually pulverized limestone—must be spread to within 40 ft. of the working face. The mixture must be 65% incombustible.—Business Wk, M 1, 45



UMBRELLA TRUSS

Designed by William H. Creighton, these umbrella roof-trusses use only 5 lb. of steel per sq. ft. of roof. In this 39,000 sq. ft. one-story factory-warehouse, columns are spaced 43x50 ft., steel purlins at 7¼ ft. intervals. Three Warren trusses, 50 ft. apart, span width. Inverted V-trusses, 17 ft. apart, run the length of the building. —Eng News-Rec, May 6, 11



LOOMSIDE of welded steel construction adds strength without adding weight

Kellogg Loom Features Unit Assembly, Welded Frame

Unit assembly, welded steel frame construction, and precision engineering are featured in the new M. W. Kellogg Co. loom, which produces high quality cloth at high speeds with lowered maintenance costs (see McG-H Digest, May, p. 21). Working easily at between 220-230 picks per min., a wide range of cottons and 75-den. acetate filament rayons have been produced at 226 ppm.

Welded construction of loomside gives rigidity without weight, each side weighing only 190 lb. Cross girts are steel channels welded to loomside, joined by two H-section channels and steel plates. Tubular loom arch carries electrical connections across loom. Extruded aluminum lay and reed cap, aluminum shuttle box and binders cut vibrations.

Only the crankshaft crosses the loom. It is divided into three sections and is connected by two universal joints which dismount easily for maintenance. Most major units and motions are constructed as demountable units.

The 40-in. loom occupies 5 x 8 ft. of floor space.—Textile World, Jn, 118

Sound Reception by Intercarrier Television

The intercarrier system of television sound reception amplifies the picture and sound signals in the picture, or video, i-f amplifier. This type of receiver differs from the conventional receiver in that the latter has a separate i-f amplifier for sound.

Originally, the principal advantage of the intercarrier system appeared to be economy by elimination of one i-f amplifier. But is is clear now that economy is not the most important advantage.

Its principal technical advantage is its immunity to idiosyncrasies of the local oscillator of the receiver, such as frequency modulation from hum and microphonics, as well as frequency drift.

A second advantage is that tuning of an intercarrier receiver is considerably simplified because the sound is always correctly tuned in when switching from one station to another. Moreover, the system is somewhate freer from interference effects, and local oscillator design can be somewhat less expensive.

Primary disadvantage of the intercarrier system is that any unusual effect present in the picture carrier can have a corollary effect on sound output. An example occurs whenever the picture modulation is so heavy that the picture carrier disappears completely during transmission of a peak white portion of the picture. Result is no sound signal.

A second effect is that caused by any phase or frequency modulation of the picture carrier. Variations are imposed on the 4.5-mc. beat note and cannot be separated from frequency modulation of the sound signal.

Other difficulties of the intercarrier system are distortion caused by sound carrier exceeding a certain level relative to picture carrier. The latter effect can be controlled by care in design of the i-f pass-band curve.—Electronics, Jl, 72

Good Vision Increases Production, Reduces Rejects

Safety programs encouraging use of goggles have done much to reduce number of eye accidents. But too few companies have gone further—to aid in vision correction. Here are some proofs.

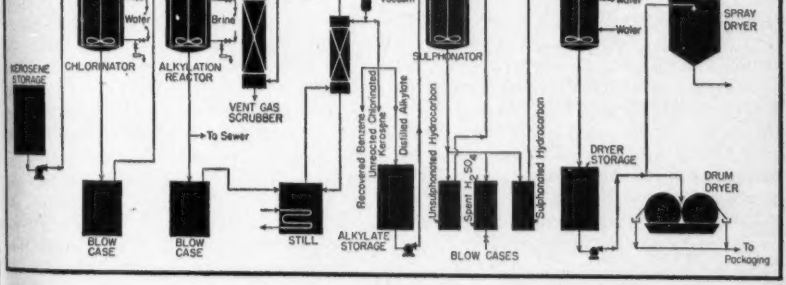
A study of 700 employees in a metal-stamping department showed a 37.5% saving on wastage after correction of visual defects with glasses. In another plant, 20% of assembly workers were provided with glasses, lighting system was improved, and a rest pause was introduced to lessen eye strain. Output rose 19.5%, rejects down 16.2%.

Effective lighting, even without corrective glasses for employees, pays for itself. One pulley factory spent an equivalent of 5% of its payroll on good lighting and increased production 37%. A heavy-steel machining plant at 1.2% of payroll cost increased production 10%. An electric-iron manufacturer at 2.5% of payroll cost raised production 12%.

But new lighting systems should be engineered for the job. An installation should only be made after a lighting study shows definitely what is needed.—Am Mach, Jn 17, 107

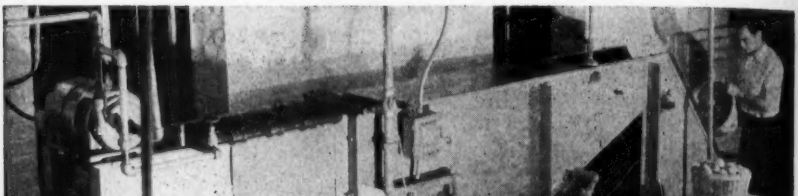
Jets Clean Piles With Hood

Cleaning 246 18-in. open-end steel-tube piles 48–60 ft. long was simplified by using high-pressure air and water and a deflecting hood to direct effluent into a 5-yd. bucket. Jet pipe was passed through hood and bonnet fastened to a sleeve fitted over pile. After spoil had been forced out, bonnet was removed and remaining spoil blown out by high-pressure air delivered at bottom of the pile. Then base was compacted by 20-ft. lengths of 8-in. pipe with a 16-in. disk base.—Cons Meth, Jn, 104



SYNTHETIC-DETERGENT FLOWSHEET

Production of alkyl benzene sulphonate, a synthetic detergent, involves three steps: (1) combining an alkyl group with an aromatic hydrocarbon, (2) sulphonating the resulting alkyl aryl hydrocarbon, and (3) neutralizing the sulphonic acid. First step includes chlorination of kerosene fraction in jacketed reactor, alkylation by reacting chlorinated kerosene with benzene, and purification by distilling. Alkyl benzene is then sulphonated by sulphuric acid. The reaction mass is allowed to settle, and spent sulphuric acid and unreacted hydrocarbon layers are separated from sulphonated compound. Latter is drowned in ice water, neutralized with sodium hydroxide in tank provided with cooling coils, and stored. These processes are comparatively complicated, particularly for newer method of using olefin polymers.—Chem Eng, Jn, 120



DRAPER-TYPE SCALDER, used for experimental work, immerses product in hot lye bath contained in V-bottom tank, conveyor-fed from pre-wetting bath

Lye Peeling Fruits, Vegetables

Research results show that the method is suitable for peeling all sizes, shapes, and varieties of peaches, pears, root vegetables

PEELING OF FRUITS and vegetables by a lye solution is satisfactory for preparing them for canning, freezing, or dehydration. Results of 8 yr. of research by the Georgia Agricultural Experiment Station, in cooperation with the Tennessee Valley Authority and the Solvay Process Co., show that quality of lye-peeled products is as high as those peeled by other methods and yield is practically the same.

The method proved to be rapid, efficient, and economical, and it could be adjusted to small as well as large operations. For continuous trouble-free processing, certain requirements were found necessary.

Equipment consists of a scalder (draper-type, lye-spray, or mill-wheel), washer, and preferably an acid rinser in which any remaining trace of lye is neutralized in 2% citric or phosphoric acid. Each kind and variety of product, moreover, demand certain lye concentrations, temperatures, and times, so commercial units should have concentration indicators, thermostats, and speed controls.

Lye concentrations vary widely: 1% for tender-skin products such as figs; 5% for moderately tender-skin products —peaches, freshly dug sweet potatoes, new white potatoes, carrots; and 10-12% for tough-skin products—pears, cured sweet potatoes, old white potatoes, pumpkins, winter squash.

Heating the bath increases peeling speed. Suggested temperature is 212-220° F., depending on lye concentration, for all products except peaches for freezing, in which case temperature should not exceed 150° F. Otherwise, dark brown "heat rings" occur beneath their surface, as such peaches are quite ripe and soft.

Processing periods in the lye solution run from 1 to 10 min., varying with toughness or thickness of skins. If treatment time is too short, extra trimming

is necessary; if too long, product becomes too soft and peeling loss is greater. The time should be just long enough for the lye to disintegrate the peel to the desired depth and to eat out rotten spots, bruises, and insect bites.

Treatment times found satisfactory were: 1.2 min. for Golden Jubilee peaches, 1¾-2 for Elberta peaches, 4 for uncured sweet potatoes, and 6¼ for cured potatoes.

The amount of alkali needed varied with product—from 3¼ lb. for 1,000 lb. of peaches to nearly 30 lb. for 1,000 lb. of cured sweet potatoes. Pears, carrots, and beets required about half as much as potatoes.

Addition of wetting agents to baths was found helpful. They decreased peeling time, increased yield, and reduced alkali use, although exact action varied with the character of the compound.

Sodium carbonate decreased peeling time on peaches 12% with no difference in yield or lye use. Sodium phosphates reduced peeling time about 12%, raised output about 2%, and, with the exception of tetrasodium pyrophosphate, decreased lye requirements.

Organic sulphonates gave about the same results for peeling time and yield. Combinations of inorganic and organic compounds were also found effective: 12-16% reduction in peeling times, 2-8% greater yield, and 0-48% less alkali consumption.—Food Ind, Jn, 101

Duckbills Work in Shifts

Two duckbill crews are used at South-East Coal Co.—one crew of 10 men, the other of eight. The 10-man crew works two places, four men to the place plus a timerman and a hoistman. In fresh cut coal, duckbill loads out right half while holes are drilled in the center and while machine is cutting left side. After right side is loaded out, machine withdraws duckbill and center is fired. Duckbill then loads out left side.—Coal Age, May, 102

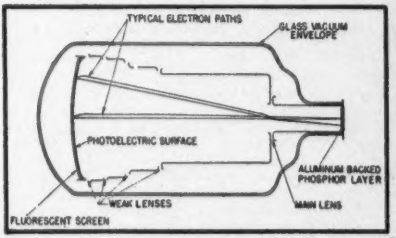
Special Boiler Design for Blast-Furnace Gas

Low Btu. value and heavy flue dust make special designs necessary for boilers heated by blast-furnace gas. Supplying, as it does, 60% of a typical steelmill steam load, the gas must be burned in large quantities because of its calorific value of only 92 Btu. per cu. ft.

Resulting flue products also reach volumes far greater than with other fuels; flue dust, too, is greater which requires generous design factors. Moreover, as gas supply fluctuates, boilers should be designed for alternate fuel use, usually coal, coke, breeze, or oil.

Simplest design employs fuel oil as auxiliary fuel, used in lighting up and as standby. Some designs are based on combination firing of blast-furnace gas and coke breeze, wherein the breeze burns on a traveling-grate stoker. Others use both breeze and fuel oil as alternate fuels.

Other necessary features are liberal clearances in burner design and easily accessible hand holes for inspection and cleaning.—Power, Jn, 84



BRIGHTENS X-RAY PICTURE

This "X-ray telescope" developed by Westinghouse Electric Corp. will give physicians a much clearer view of patients under examination. X-ray image of the viewed object is cast on a fluorescent screen, producing light rays which create electrons in the tube. Electro static lenses guide and brighten the reflected electrons that pass through the main viewing lens.—Business Wk, May 29, 23

NEW PRODUCTS

Indicates Level — Magnetic-type instrument developed by Westinghouse Electric Corp. for liquid-level indication consists of two replaceable assemblies. Outer one includes dial and an indicating needle mounted on shaft carrying magnet. Another magnet is coupled through shaft to float arm. Any motion of arm rotates second magnet, which in turn displaces outer magnet and needle. —Oper Eng, Jn, 76

Semi-automatic Welder—Developed by The Lincoln Electric Co. and recommended for welding all types of joints, semi-automatic submerged-arc. dc. welder can be changed from butt to fillet welding in a few minutes. One type and grade of flux, together with one analysis of electrode, can be applied with same procedure for wide range of steel analyses.—Weld Eng, May, 75

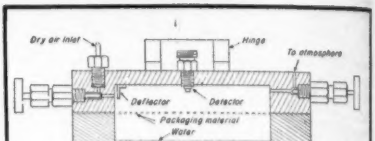
No Packing Needed—A packless valve has seamless bellows that provide a leak-proof seal between the valve disk and body. Offered by Robertshaw-Fulton Controls Co., it is available in sizes from ¼ to 3 in. and will stand temperatures up to 700° F.—Prod Eng, Jn, 180

Synchronizes Speed — The Short Stroke Dancer Roll Control, announced by Reliance Electric & Engrg. Co., is designed for synchronizing the speed of independently driven machines. Applications will be in paper finishing, rubber extrusion, and other continuous process operations.—Electronics, Jn, 213

Reduce Joint Friction Heat—Two shallow grooves in bearing surfaces of a new center block minimize friction heat by creating 16 instead of 4 surfaces. Lubrication is improved. Curtiss Universal Joint Co. developed the new block.—Aviation Wk, May 31, 27

Water-, Weather-proofs Paper — A special transparent coating will protect printed paper against water, heat, and acid stains. Different coatings are used according to desired protection. It is a development of Duro-Card Products.—Business Wk, Jn 5, 56

Low-pressure Oxygen Process—Elliott Co. has announced new oxygen process, intended for producing tonnage oxygen of 95% purity. It employs reversing changers, reversed every 3 or 4 hrs. instead to 2-3 min. as in other systems. Recovery of oxygen from air of 97% is claimed, with nitrogen pure enough for chemical raw material use.—Chem Eng, May, 153



TESTS WRAPPER

Packaging material is tested for permeability by detection of water vapor leaking through it. Detector is a thin film of liquid, usually H_3PO_4, in a gelatin or plastic binder. Spread over solid insulator between electrodes, it tends to reach equilibrium with water vapor in surrounding gas and so forms a solution wherein electrical conductance is measure of vapor concentration. Actual determination of tester is to find the time required for vapor above film to reach 25% concentration. Time is then measure of permeability.—Food Ind, Jn, 109

Standardizes Welding Guns. — Spot-welding guns, offered by Progressive Welder Co., are constructed from interchangeable component parts. Seven basic types are said to take care of 95% of all gun-welding requirements. Basic parts are gun chassis, cylinders, handles, terminal clamps, switches, electrodes, and holders.—Am Mach, Jn 17, 147

Aluminum Roofing, Siding—Lumber siding can be replaced by aluminum siding and roofing, available in lengths of 10, 12, 14, and 16 ft. and 6⅞ in. wide. Aluminum can be applied directly over sheathing or nailed through prepunched nail lip to studs. Lengths can be worked with wood tools; they take any house paint. When used alone only standard building paper is needed—no other sheathing.—Cons Meth, Jn, 139

Lightweight Shotfirer—Farmers Engineering & Mfg. Co.'s new light shotfirer weighs only 1 lb. It is carried on operator's belt and can be fired from that position. Safety key prevents accidental firing.—Coal Age, Jn, 217

Pocket-sized Camera Tripod—Stainless-steel coils, 5¾ in. long and 1½ in. thick, uncoil to form a 6-ft. tripod for cameras. Tripods are uncoiled easily by hand twisting. Legs are free of vibration. W. K. Mfg. Co. developed them.—Science Ill, Jl, 71

Straightens Filling—Filling cloth in finishing, bleaching, or printing phases is straightened by reflected light in a new unit developed by Windsor & Jerauld Mfg. Co., Inc. Pre-focused lights are directed to cloth surface, photoelectric cells picking up the reflected light and giving a signal to the electronic controls on moveable rolls. They then take corrective action.—Textile World, Jn, 140

Speeds Door Hanging—Hinge recesses in door and jamb now can be cut on the job or in lumber yard in one operation by a new jig. Jig also cuts recesses for lock plate and keeper plate. The Universal Specialties Co. unit weighs 35 lb.—Business Wk, May 29, 71

Feeds Chemicals—Liquid Conditioning Corp.'s Decantrol feeds chemicals, either in solution or suspension, to water that is to be chemically treated for softening or clarification. Adapted to either constant-rate or proportioning-rate control systems, it is a totally enclosed unit mounted on top of chemical feed tank.—Power, Jn, 152

Small Fan Motor—Shaded-pole induction motor, developed by Heinze Electric Co. for driving 6- to 12-in. fans and blowers, is rated from 1/100 to 1/40 hp. at 1,550 rpm. on 115 or 230 v., 50 or 60 cycles. Motor can be furnished with ventilated or non-ventilated pressed steel case, single- or double-extension shaft, and thrust bearings for vertical use. —Prod Eng, Jn, 170

Pump Raises Scaffolding—Pump, held by three grips, moves scaffolding up or down 4x4 in. timbers. No ropes, hooks, or nails are used. Pumps hold 24-in. scaffolding and can be adjusted for 12- or 18-in. planking. Pumps were developed by Newark Ladder & Bracket Co., Inc.—Eng News-Rec, May 13, 116

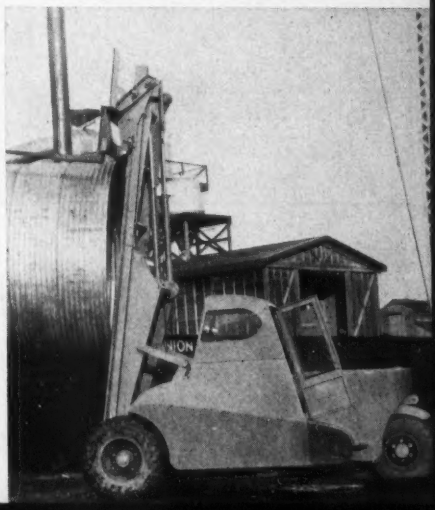
New Airplane Brakes—New double disk brakes for commercial transports permit visual checking of lining before flight. Unit is equipped with a self-adjustment mechanism. Brakes are a development of Aviation Products Div., Goodyear Tire & Rubber Co.—Aviation Wk, May 3, 29

Centrifugal-Pump Drive—Developed by Electric Machinery Mfg. Co. to afford smooth speed control for centrifugal pumps, the unit combines vertical synchronous motor and magnetic drive unit. Magnet member mounted on gear shaft operates pump at speed required by liquid-level control.—Elec World, Jn 5, 136

Pipe Foil-clad—Protection of insulation from weather is afforded by new covering method developed by Ric-Wil Co. Insulated pipe is machine-coated with asphalt and tension-wrapped with asphalt-saturated asbestos felt. Second asphalt coating is followed by wrapping of aluminum or copper foil. Similar unit is available with a double-concentric pipe.—Chem Eng, Jn, 148

Aluminum Mine Cables—Aluminum bore-hole and mine entrance cable, developed by U. S. Rubber Co., weighs 50% less than copper cables and costs 30-50% less. Cables can be lowered and supported without elaborate equipment because of lowered weight. Neoprene rubber covering resists oil and acid.—Eng & Min J, Jn, 112

Lightweight Water, Room Heater—Fowler Mfg. Co.'s new combination heater gives 5 gal. of hot water and provides room heat. An adjustable register controls warm air; hot water is available when register is closed. Enamel lined to combat rust, the heater has 3-way insulation, automatic temperature control. It is 28x12x13-in. and weighs less than 40 lb. It is available in 750 or 1250 watts, 110-v.—Elec Merch, Jn 15, 17



SIDEWISE CONTROL FOR LIFT TRUCK

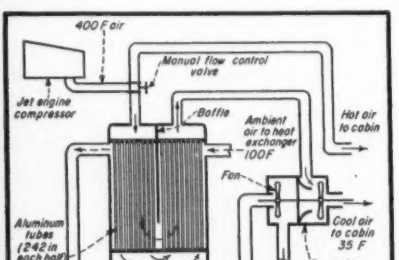
Driver and his controls are sidewise in Mixermobile Mfg.'s new heavy-duty lift truck to improve visibility and control of load. The tricycle unit has front-wheel drive, tail-wheel steering. The 114-hp. engine gives it a forward speed of 20 mph., reverse 30 mph. Loads up to 16,000 lb. can be handled by the 9½ ft. high mechanical carriage hoist. Other controls are hydraulic.—Business Wk, Jn 5, 64

NEW PRODUCTS

Upends Drums Easily—Upending of heavy drums is simplified by a 36-in. long steel bar with special grip which fits firmly over drum lip. It is made of 1-in. steel bar which will not bend or break. Drum lip is not damaged. Melooz Mfg. Co. designed the tool. —Factory, Jn, 148

Corrosion Testing Multimeter—Meter, designed for electrolysis and corrosion investigation and cathodic protection testing in field and laboratory, is announced by M. C. Miller. It provides all instrumentation required to cover wide range of dc. and potential measurements necessary in this field.—Electronics, Jn, 212

Linseed, Soybean Paint Oils—Paint and varnish oils, called Amerols, are produced by linseed and soybean derivatives with butadiene, styrene, acrylic acid, and other chemicals. The new oils set fast, dry thoroughly, have low acidity, high stability, and retain color well. The Archer-Daniels-Midland Co. oils cost 15-20¢ per lb.—Business Wk, May 22, 55



HIGH-SPEED TURBINE

AiResearch Mfg. Co.'s 5-lb., 100,000-rpm. turbine unit for cooling jet-plane cabins (see McG-H Digest May '48, 43) operates by hot pressurized air, bled from engine compressor, entering cabin air inlet and passing through heat exchanger to turbine. Cooling air from atmosphere enters exchanger through ambient air intake, passes to turbine, and exhausts to atmosphere. In passing through nozzles and along turbine-wheel blades, pressurized air expands and cools. Cabin temperature is controlled by regulating flow valve to obtain suitable mixture of hot and cool air.—Prod Eng, Jn, 98

Cellular, Inorganic Insulation—Fireproof insulating material, of cellular, inorganic materials, is available in 11- or 20-lb. per cu. ft. densities. It can be worked with standard wood tools. It will withstand temperatures to 1000° F. The 20-lb. density is applicable where both structural strength and insulation are necessary; *e.g.* fireproof doors, roof tile, or other building purposes. It is an American Structural Products Co. development.—Factory, May, 142

Automatic Disk Placer—Announced by Hope Machine Co., the attachment places parchment paper disks on paper food containers. Disks are handled by vacuum cups as the mechanism brings disks down to, and presses them lightly on, the product. Opening of vacuum valve releases cups.—Food Ind, Jn, 160

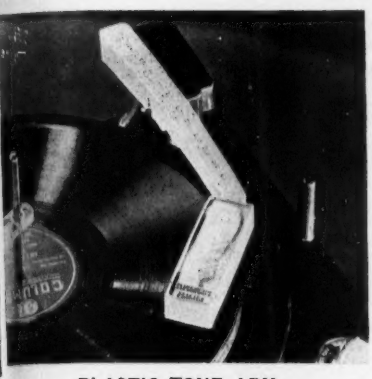
Photoelectric Wattmeter—Designed by the Meter and Instruments Div. of General Electric Co. for such uses as analyzing welding circuits and measuring industrial heating load and power surge, the meter has a high-speed photoelectric recorder. It measures dc. or ac. up to 10,000 cycles per sec. Chart speeds are ½ in. per hr. to 72 in. per min. —Elec World, May 22, 160

Projection Welder—Taylor-Winfield 150-kva. projection welder delivers 58,000 amp. with a low power demand of 348 kva. at 61% power factor. High electrical efficiency is attained through special divided secondary with low impedance. Upper electrode holder is raised or lowered by air.—Weld Eng, Jn, 60

Flexible Floor Conveyor—Flexible, portable conveyor, offered by Flexoveyor Mfg. Co., handles bags and cartons weighing up to 200 lb. at 85-200 fpm. The flexible unit, in 15-ft. lengths, can turn 90° in either direction. One motor operates up to 60 ft.—Chem Eng, May, 160

Removes Nylon Elasticity—Elasticity from finished nylon thread, cord, or braided line are removed with W. M. Steele Co., Inc.'s, new hot stretch machine. Heaters are brought to and kept at proper temperature by automatic controls. Stretching speeds of 600 fpm. are permissible.—Textile World, Jn, 142

Checks Wiring Systems—An analyzer developed by Leco Eng. Co. tests new or old wiring systems under simulated load conditions. A powerizer source attaches to entrance panel to supply simulated load current, while a rectifier meter with four-scale dial shows circuit identification, insulation resistance, ground resistance, and ac. volts.—Elec C&M, Jn, 86



PLASTIC TONE ARM

Westinghouse tone arm, injection molded of cellulose propionate, improves reproduction, cuts down wear and tear on records because of its light weight. Dimensional stability of plastic prevents mechanism from getting out of line. As cellulose propionate is non-conductor of sound, it picks up no vibrations or noise.—Prod Eng, May, 85

Cars Washed, Waxed At Once—Using C-Z Chemical Co.'s new compound, car washing and waxing is a one-step operation. Wax is mixed with water and applied with sponge. Water carries off dust and dirt, and wax sticks to finish. Surface is polished with a dry cloth. Entire operation takes 30 min.—Business Wk, May 1, 52

Industrial Heater—Available as a package unit, the heater is direct-fired with capacity of 125,000 Btu. per hr. and temperatures to 350° F. Fan capacity is 1,000 cfm. Developed by Gas Appliance Service, Inc., the package includes fan, motor, drive, safety devices, and temperature controller.—Food Ind, Jn, 161

Flux-injection Torch—Hand torch is announced by Air Reduction Sales Co. for cutting stainless steel by flux-injection method. A remote control cutoff coordinates flux feed with cutting oxygen.—Weld Eng, Jn, 63

Controls Torque—Remote torque control for industrial applications has been developed by Eclipse-Pioneer Div., Bendix Aviation Corp. Units are transmitter Autosyn, torque unit, and amplifier. Different gear ratios and motor sizes are available to provide torque outputs from a few g.-cm. to several ft.-lb.—Elec World, May 22, 158

Custom-tailored Compressors—Designed for either air conditioning or low-temperature duty, reciprocating-compressor units are made so they can be assembled in more than 1,000 different combinations. Compressor, motor, base, coupling, and condenser can be individually selected to meet specific requirements of the job. They are offered by Carrier Corp.—Oper Eng, Jn, 74

Picking Cylinder on Wool Duster—A picking or opening cylinder working with the dusting cylinder combines picking operation with dusting in the new Proctor & Schwartz willow. Picking cylinder has flat blades which penetrate fibers without tearing them. Unit processes 2,000-2,500 lb. of wool per hr.—Textile World, Jn, 139

Trim-tab Control—Trim-tab system control is centralized in General Control Co.'s new unit. Two levers actuate six switches governing forward and reverse fields of three electrical thrust motors controlling aileron, elevator, and rudder trim tabs. Unit measures 3 11/16 x 3 7/16 x 3½ in.—Aviation Wk, May 31, 27

Hand-operated Bar Cutter—Model 223 abrasive bar cutter, announced by Andrew C. Campbell Div., American Chain & Cable Co., has been designed for fast cuts on practically all materials up to 2-in. dia. solid stock and 3½-in. dia. tubing. Features include automatic coolant-pump operation and automatic work clamping.—Am Mach, Jn 17, 148

Three-wheeled Loader—Mounted on a gasoline-powered, 2-wheeled tractor, Arrow Contractors Equipment Co.'s loader handles a 6-cu. ft. bucket. Load is concentrated on the two front power wheels. Bucket can be raised 6 ft. high. Four speeds forward and one reverse are available.—Cons Meth, Jn, 120

Joint Expands—Self-equalizing, compression-distributing expansion joint, developed by Zallea Bros., employs several pantograph chains on outside edge of equalizing rings. Any movement of end fitting is transmitted to all equalizing rings so all move same relative distance at same time.—Power, Jn, 110

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Varies Wave Shape for Medical Diagnosis

In medical diagnosis and research, it is frequently desirable to have available a stimulating current of unusual wave shape, slope, and frequency. Thus, for diagnosis of nerve and muscle lesions, a square-wave stimulus may be needed with accurately preset current flow, independent of tissue or electrode resistance, and with separate adjustments for length and frequency of stimuli.

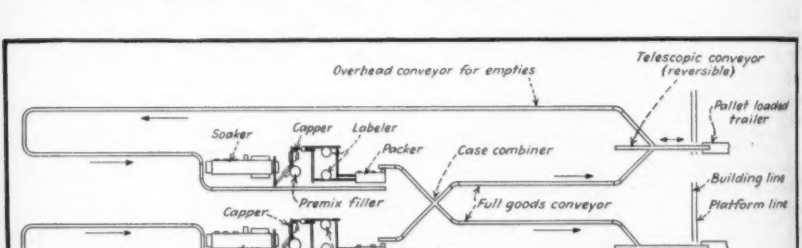
Single or repetitive stimuli may be derived from a simple silhouette, easily cut by following any desired curve drawn on cardboard. The beam of the cathode ray tube is spread vertically into a thin line by an r-f oscillator connected to vertical deflecting plates. The line thus formed is caused to move from right to left between two definite end points on the silhouette, or mask, by a relaxation oscillabor circuit.

The beam from the tube falls on a phototube, the amount received being a function of line length which it sees at any moment. This is determined by shape of mask. Phototube output is then amplified and applied to the patient. —Electronics, Jl, 99

Annual Report on Record

ATF, Inc. is putting its 1948 annual report to employees on phonographic records in an effort to better its record of 90% readership on their 1947 report (See McG-H Digest, June, p. 23). The records cost 10¢ each; the master costs $350. Since 1945, ATF has raised its readership from 35% through elimination of "cold figures." Cartoon representation of facts and figures is used extensively.

About 75% of the employees have record players. The report records are enclosed in the annual report, held by scotch tape over a printed version of the message. The center spread of the booklet "pops up" to represent a typical community scene. The pop-up display is aimed at children of ATF employees.—Factory, Jn, 126



SIMPLIFIES CASE-HANDLING OPERATIONS

Rearrangement of Pepsi-Cola's New York plant ties in conveyor handling and palletizing to reduce manual handling of cases. Empties from flat-bed trailers are fed to an overhead conveyor which carries them to a soaker from which they are conveyed to filler, capper, labeler, and packer. Combining booster combines production from two lines for delivery to loading docks. Here cases are stacked, 50 cases to the pallet, on trailers for delivery to warehouse, from which route trucks are loaded with pallets for delivery to retail outlets. Trailers need not be respotted. —Food Ind, Jn, 84

Basic Industries	1940	1946	1947	Plan 1950	1947 as % of prewar
Petroleum (million metric tons)	31.2	22.9	27.2	35.4	87.1
Pig iron (million metric tons)	14.9	10.0	11.4	19.5	77.5
Steel (million metric tons)	18.3	13.1	14.0	25.4	76.5
Coal (million metric tons)	166	166	175	250	105.4
Tractors (thousands)	34.0	14.0	28.0	112.0	82.4
Cotton textiles (million sq. meters)	4,030	1,891	2,515	4,686	62.4
Woolen textiles (million sq. meters)	124	74	98.6	159	78.4
Power capacity (million kw.)	13.2	12.7	14.7	22.4	111.3
Employment (millions of persons)	30.4	30.3	31.5	33.5	102.9

RUSSIAN INDUSTRIAL PRODUCTION ESTIMATES

Russian production figures are always given in percentages; these figures compiled by "Business Week" are estimates but quote production in number of units for major industries. Overall production still lags prewar except for coal and power capacity. Quality of output is even worse—Kolomenskoe railway engine plant reported 25% of its pistons faulty in 1947. In March 1948, rejects reached 60%. (In the July issue of McG-H Digest, Russian power output was quoted as 500,000,000-kw. hr. It should have read 500,000,000,000-kw. hr.—Editor.)—Business Wk. Jn 5, 109

Pulsed-Light Surveying Ideal for Rugged Terrain

Surveying by pulsed light is possible when conventional methods are too slow or when long traverses over inaccessible terrain are needed. An optical-electronic instrument determines distance by measuring transit time of light pulses traveling to and from a retrodirective reflector. Accuracy compares favorably with that of a third-class survey.

The unit consists of optical head, oscilloscope, power supply, and converter. The optical head, mounted on a tripod, contains a flashlamp and parabolic mirror. When lamp is flashed, the mirror directs light on the reflector set up at the point, the relative position of which is to be found.

At the same time, a sweep generator is triggered, causing a trace to appear on the cathode-ray tube. On returning to normal state, the sweep generator triggers a second sweep timer, which gates the range and trigger pip generators. These produce a second trace displaying range pips.

The light reflected back from the cube-cornered target reflector is focused on the cathode of a photomultiplier. Output of the photomultiplier is amplified and fed through a delay line to the oscilloscope where it is amplified by two additional stages to produce a vertical pip on the cathode-ray tube.

Adjusting a phase shifter for oscillator output matches range and target return pips. Oscillator frequency is such that the interval between successive ranging pips corresponds to a 500-yd. interval. Range dials then show the desired distance reading.—Electronics, Jl, 76

Checks Liquid Surface Depth

Stanford Research Institute just announced that the depth of a liquid surface has been determined to be about 1,000 atoms, or approximately 0.000001 in., indicating molecular attraction takes place over a wider range than believed.

The discovery can be applied practically in fields of lubrication, oil exploration, and biology, where reaction of liquid surfaces in contact with other materials is important.—Prod Eng, Jn, 150

Mechanization to Aid Sugar Growers' Pinch

High labor costs and the recent drop in raw-sugar prices are forcing growers to look to mechanization to ease cost pinch. New varieties of cane, plus improved harvesting and milling, may increase crop 1 ton per acre. A new planting machine will cut seed cane to proper length and chemically bathe lengths to seal in juices.

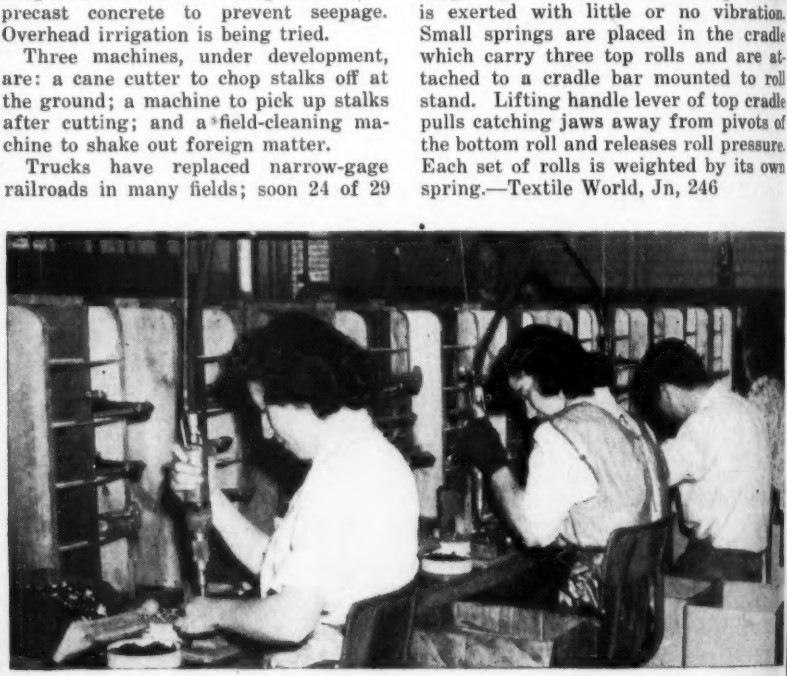
In Hawaii, much of the 240,000 mi. of irrigation ditches are being lined with precast concrete to prevent seepage. Overhead irrigation is being tried.

Three machines, under development, are: a cane cutter to chop stalks off at the ground; a machine to pick up stalks after cutting; and a field-cleaning machine to shake out foreign matter.

Trucks have replaced narrow-gage railroads in many fields; soon 24 of 29 plantations in Hawaii will use trucks for field-to-mill transportation. Cane-truck beds are lined with a steel mat to facilitate unloading. Crane hooks grasp netting and "roll off" entire load.—Business Wk, Jn 13, 46

Rolls Weighted by Springs

Weighting of drafting rolls on spinning frames by means of piano-wire springs completely eliminates conventional weights and levers. Howa Machinery, Ltd., Japan, developed the system of weighting. Smooth, uniform pressure is exerted with little or no vibration. Small springs are placed in the cradle which carry three top rolls and are attached to a cradle bar mounted to roll stand. Lifting handle lever of top cradle pulls catching jaws away from pivots of the bottom roll and releases roll pressure. Each set of rolls is weighted by its own spring.—Textile World, Jn, 246



POST OFFICE CARROUSEL CONVEYOR

Chain-operated carrousel conveyors have been found particularly efficient at Electrolux Corp. for subassembly of small parts such as rug nozzles. Called the "Post office," the wood multi-compartment carriers are bolted to steel plates attached to side links of continuous chain built into bench. Compartments permit segregation of parts by suboperations and serve as traveling storage.—Am Mach, May 20, 110

What Does European Recovery Plan Mean to Your Business?

You, as an individual businessman, may find it difficult to gain perspective on your role in so vast an enterprise as ERP. To help you, the McG-H Digest, aided by the McG-H Economics Department, has outlined the program in a series of charts

— Report to Management —

HISTORY'S GREATEST EFFORT at joint economic cooperation is now under way. It is the European Recovery Program—a concerted action on the part of 16 European nations, assisted by the United States, to restore some semblance of stability to their business and economic life.

To the business community throughout the world, this program is of extraordinary significance. It is business that is producing, procuring, and exchanging the products that are the life blood of the program. On the success or failure of the program hangs the longer-term outlook for business enterprise in many parts of the world.

The charts on the following pages picture western Europe's pattern of trade as it is expected to develop from mid-1948 to mid-1949. The relative importance of trade with the U. S., of trade with Latin America and Canada, and of trade between the countries of Western Europe themselves is shown. And the part to be played by recovery funds provided by the U. S. is revealed for each country and for each group of commodities.

The information that forms the basis for this picture was presented to the U. S. Congress when it appropriated funds for the Economic Cooperation Administration (ECA). It is this same information which now guides the joint committee of the participating nations in Paris as it makes its own recommendations on how the U. S. funds should be allocated.

What the various European countries will in the end receive may differ somewhat from the picture shown here. But these differences will not be substantial. Executives interested in specific markets may therefore gain, from these illustrations, some conception of the significance of the recovery program to their own business.

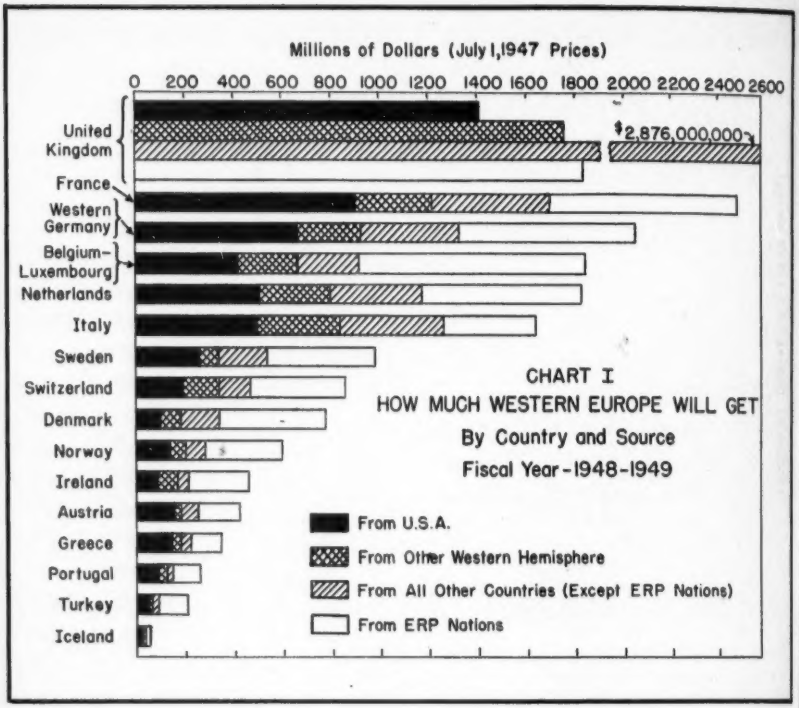
Chart I reveals two significant aspects of the trade of each of Western Europe's nations: (a) What total imports are, and (b) where each nation gets its imports. As the chart indicates, the import needs of Britain dwarf those of any other nation. Its total imports of almost $8-million are more than three times the $2.5-billion of France, next largest importer. Third in line is Germany ($2-billion), followed closely by Belgium and the Netherlands.

Britain also depends most heavily on the U. S.—at least in the sense that it

TABLE I—IMPORTS TO WESTERN EUROPE

(In Millions of Dollars)

Source	Amount	Percent of Total
United States	5,630	24.8
Rest of West. Hem.	3,830	16.8
Other ERP Nations	7,685	33.8
Other Countries	5,591	24.6
Total	22,736	

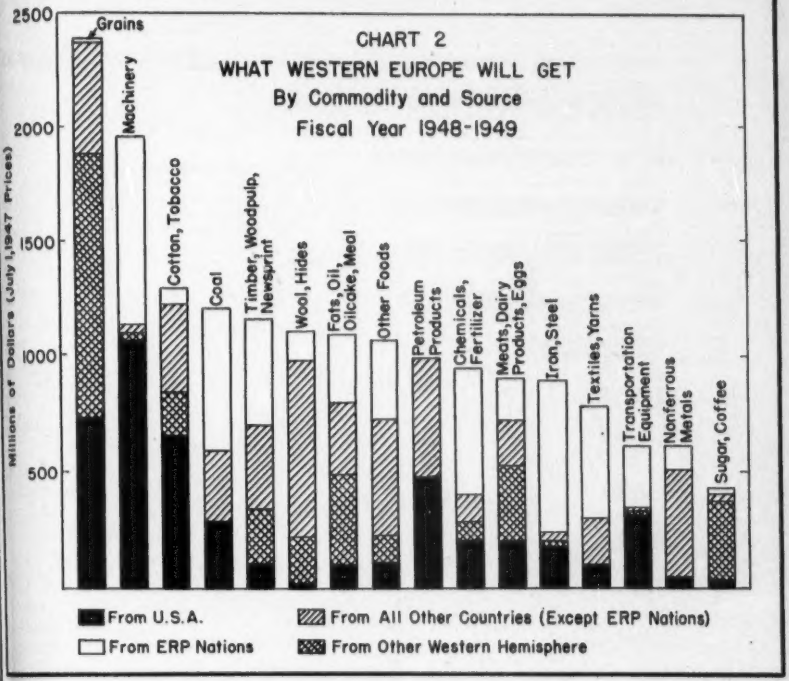


requires more from the U. S. than from any other country. Yet the chart also reveals that Britain relies more on its empire and on Western Europe for supplies, than it does on the U. S. France, Germany, Italy, and the Netherlands, all require the U. S. to provide a larger proportion of their total supplies than does Britain.

One other aspect of this trade deserves mention. The nations of Western Europe do more trading among themselves than they do with other areas. Initial plans called for total imports of these nations to come to $22.7-billion. Anticipated sources of these supplies are shown in Table I.

What commodities will go to make up this tremendous volume of trade flowing to and within Western Europe? Chart 2 reveals this at a glance. Foodstuffs are by far the most important items on the trade list, accounting for approximately one-fourth of the total value. While food imports are particularly vital to Britain, Western Germany, and Italy, they are of significance to almost all the nations.

Grains bulk largest among these imported foodstuffs. Almost half were initially expected to flow from Latin America and Canada. This proportion is now changing, although not radically, with a somewhat larger amount expected from the U. S. Very little grain—and a small amount of other foodstuffs—is traded between countries of Western Europe.



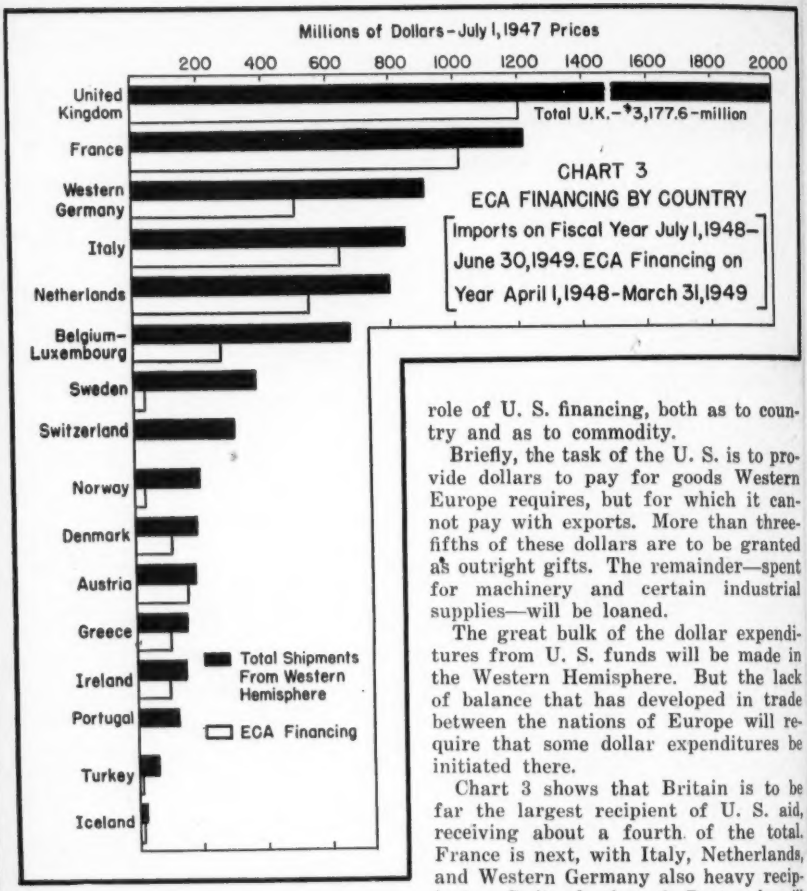
Meats, fats, oils, sugar, and coffee are other principal foodstuffs Western Europe must import. Again Latin America is to be a big supplier. But in the case of meats, fats, and oils, Oceania and the Far East also are scheduled to provide large quantities.

A second main group of imports—no less vital than foodstuffs—are industrial materials. Western European countries must trade to obtain coal, petroleum, cotton, non-ferrous metals, iron, and steel. Huge quantities are involved in each instance. Normally, the area itself will provide its own coal, iron, and steel. However, as Chart 2 shows, the U. S. must furnish an important margin of these supplies over coming months.

Oil will come from two main sources—the Middle East and Venezuela. Since U. S. companies provide most Venezuelan oil, Chart 2 includes it as a dollar commitment. Cotton is to be shipped from many areas, but the U. S. remains the major supply source for the movement.

In some respects, the most important commodities to be obtained from the U. S. are those that make up the machinery group. Foodstuffs and raw materials will help keep Western Europe going as it is. But machinery is needed if the area is to expand its ability to produce and thereby also to increase its ability to export.

The nations of Western Europe will themselves turn out most of the ma-



chinery they require. More than $1-billion of equipment, however, is to be obtained from the U. S. Table II shows how trade in various categories of equipment is expected to line up.

This, then, is the pattern of trade which Western Europe hopes to achieve in the first year of its recovery program. But how does U. S. assistance fit into this picture? Charts 3 and 4 show the role of U. S. financing, both as to country and as to commodity.

Briefly, the task of the U. S. is to provide dollars to pay for goods Western Europe requires, but for which it cannot pay with exports. More than three-fifths of these dollars are to be granted as outright gifts. The remainder—spent for machinery and certain industrial supplies—will be loaned.

The great bulk of the dollar expenditures from U. S. funds will be made in the Western Hemisphere. But the lack of balance that has developed in trade between the nations of Europe will require that some dollar expenditures be initiated there.

Chart 3 shows that Britain is to be far the largest recipient of U. S. aid, receiving about a fourth of the total. France is next, with Italy, Netherlands, and Western Germany also heavy recipients. Switzerland and Portugal will require no aid, although they will benefit indirectly through the healthy economic life which the program is expected to restore to Western Europe. Belgium and Sweden are other countries that need little in the way of direct assistance.

Although Britain is to receive more aid than others, ECA financing is of greater relative importance to the trade

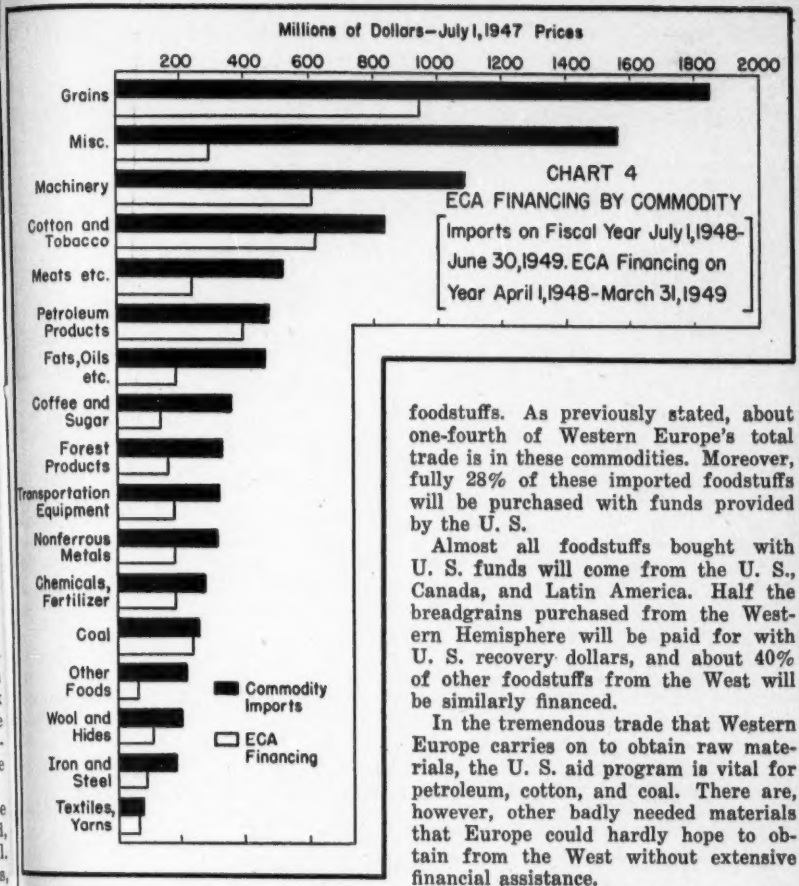


CHART 4
ECA FINANCING BY COMMODITY
[Imports on Fiscal Year July 1, 1948-June 30, 1949. ECA Financing on Year April 1, 1948-March 31, 1949]

of France, Italy, Western Germany, and the Netherlands. More than two-fifths of France's imports from all over the world will be financed in this manner. And the U. S. will finance fully one-third of Italy's total imports, some 30% of Netherland's imports, and 25% of the imports of Western Germany.

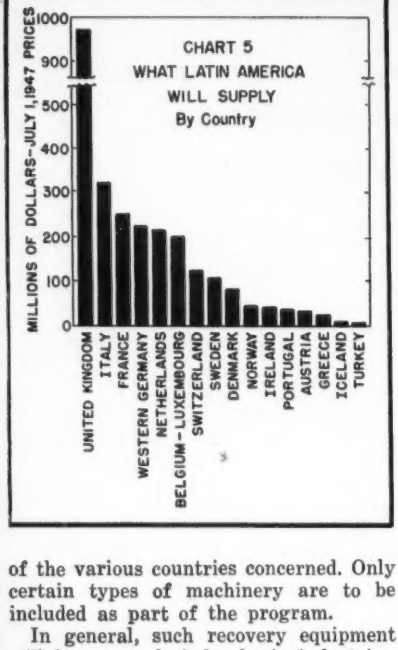
The largest portion of U. S. recovery funds are to be spent for the trade in foodstuffs. As previously stated, about one-fourth of Western Europe's total trade is in these commodities. Moreover, fully 28% of these imported foodstuffs will be purchased with funds provided by the U. S.

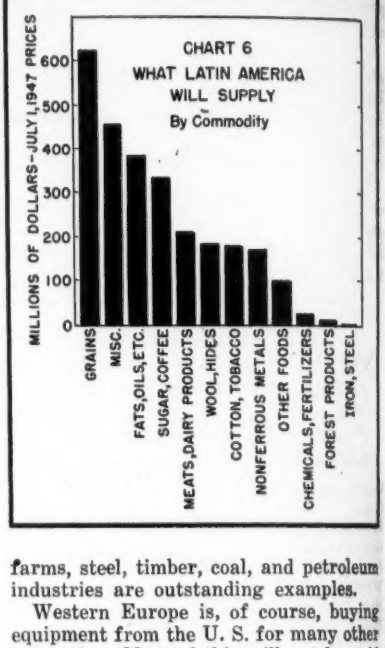
Almost all foodstuffs bought with U. S. funds will come from the U. S., Canada, and Latin America. Half the breadgrains purchased from the Western Hemisphere will be paid for with U. S. recovery dollars, and about 40% of other foodstuffs from the West will be similarly financed.

In the tremendous trade that Western Europe carries on to obtain raw materials, the U. S. aid program is vital for petroleum, cotton, and coal. There are, however, other badly needed materials that Europe could hardly hope to obtain from the West without extensive financial assistance.

Table III lists the dollar value of this trade for a number of commodities, and indicates the proportion that preliminary estimates suggest are to be paid for out of U. S. recovery funds.

Of machinery and equipment to be purchased in the U. S., a little more than half will be financed as part of the recovery program. In these instances, financing will be in the form of loans provided by the U. S. to the governments





of the various countries concerned. Only certain types of machinery are to be included as part of the program.

In general, such recovery equipment will be earmarked for basic industries, the expansion of which is needed to raise the over-all productive potential of the country. Equipment for electric power, farms, steel, timber, coal, and petroleum industries are outstanding examples.

Western Europe is, of course, buying equipment from the U. S. for many other industries. Most of this will not be paid for with recovery dollars. But without the U. S. foreign-aid program, Western Europe's exchange position would not

TABLE II—EQUIPMENT IMPORTS TO WESTERN EUROPE

(In Millions of Dollars)

Type of Equipment	Source			
	U. S.	Rest of Western Hemisphere	ERP Nations	All Other Countries
Agricultural	75.0	21.7	92.9	1.7
Coal Mining	81.9	....	65.0	....
Steelmaking	48.1	....	....	....
Lumbering	15.9	0.1	6.5	....
Electrical	95.0	....	203.6	....
Petroleum	226.7	....	....	....
Misc. Machinery	512.6*	18.0	470.8	31.7
Total	1,055.2	39.8	838.8	33.4

* Includes about $133-million of machine tools.

permit it to buy most of this latter equipment.

An improved supply position for grains, both in the U. S. and Western Europe, may lower this figure somewhat. But the change will not be so radical as to distort greatly the picture laid out in Charts 5 and 6.

Britain again is the main customer of Latin America. Its purchases may run in excess of $950-million, including the huge contract for meat and foodstuffs which it already has negotiated with Argentina. Italy ($321-million), France ($251-million), Western Germany ($225-million), and the Netherlands ($217-million), are other important buyers.

In addition to grains, Argentina's fats and oils, Brazil's coffee and cotton, Chile's copper, Venezuela's oil, and Cuba's sugar are essential to a healthy Western Europe. Yet here again the nations participating in the recovery program cannot provide sufficient exports to Latin America to pay for such essentials. As a result, a good share of these commodities from Latin America will be purchased with U. S. dollars.

It is impossible to say at this time, what "offshore" buying by the U. S. in Latin America will total under the recovery program. Purchases may well run between $1.2- and $1.5-billion.

TABLE III

VITAL COMMODITY IMPORTS TO WESTERN EUROPE

(In Millions of Dollars)

Commodity	From Western Hemisphere	% ECA Finance
Cotton	606	84.3
Coal	271	90.4
Petroleum	479	79.1
Iron and steel	189	50.8
Non-ferrous metals	321	59.5
Wool	77	32.5
Hides, leather	132	67.4
Timber	267	53.2

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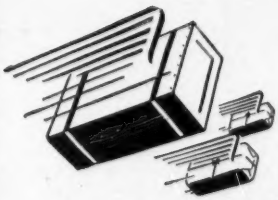

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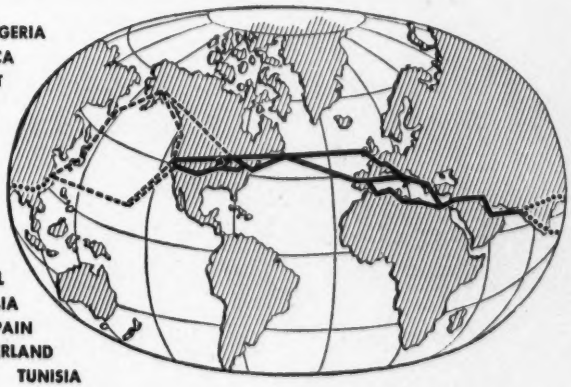

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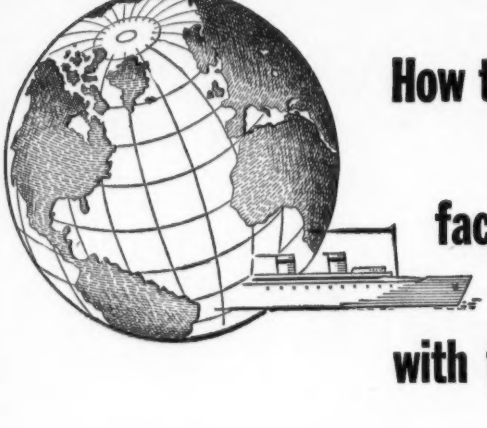

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**Source: Estimated from United Nations and U. S. Public Health Reports.*

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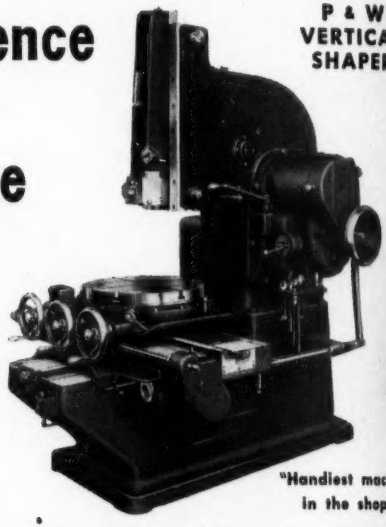

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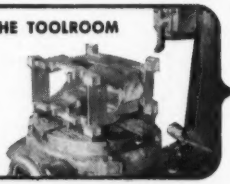
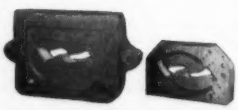


Thirty-five irregular slots and surfaces of this box jig were machined without a change in setup.

IN THE DIE SHOP



Irregular contours in this die and die-shoe were machined in 8¼ hours. How long would your present equipment require?

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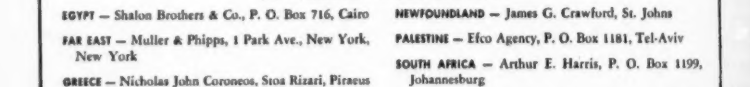

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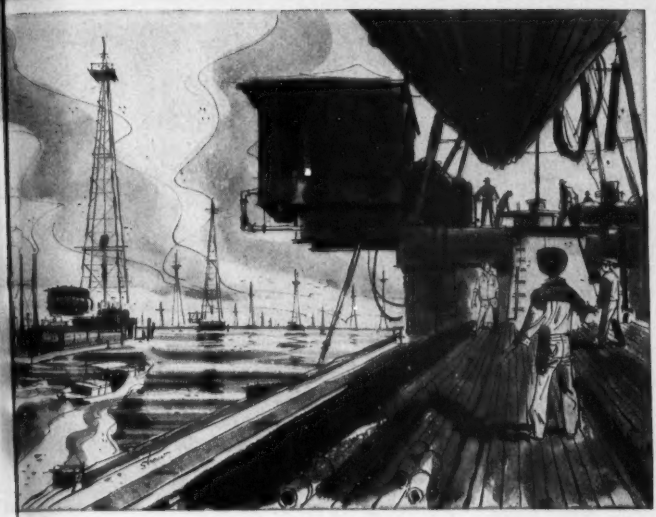

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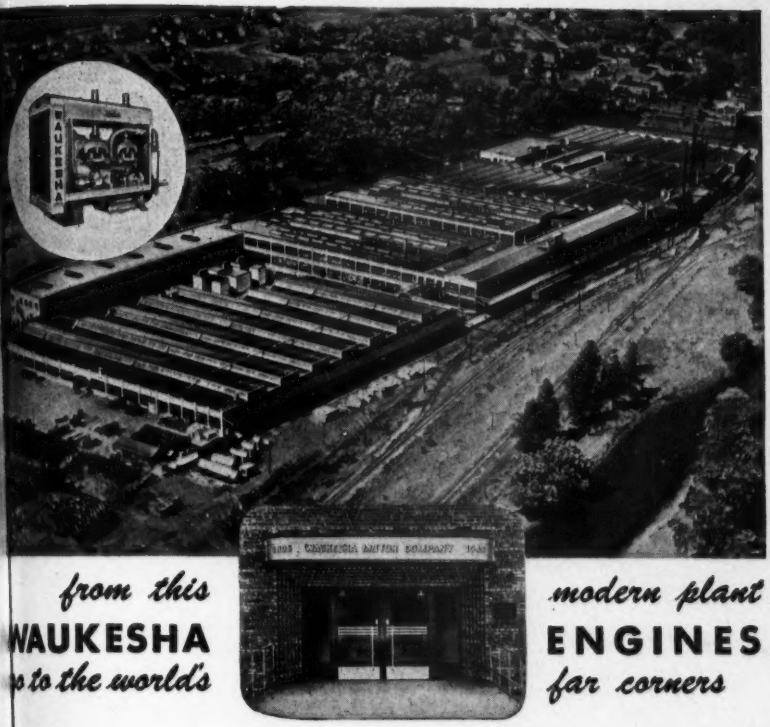

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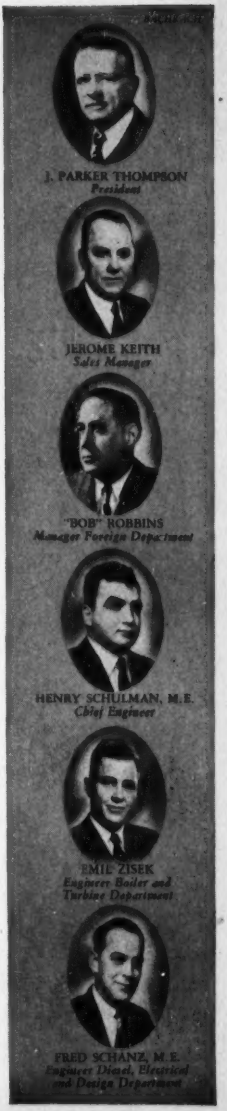

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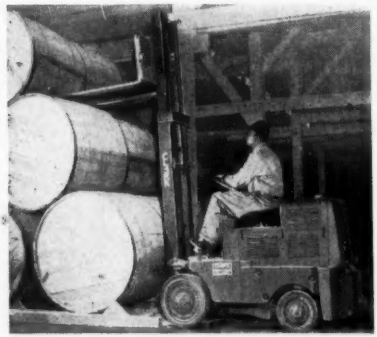

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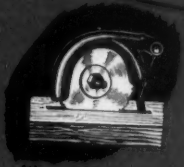

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